SAN Bagging*

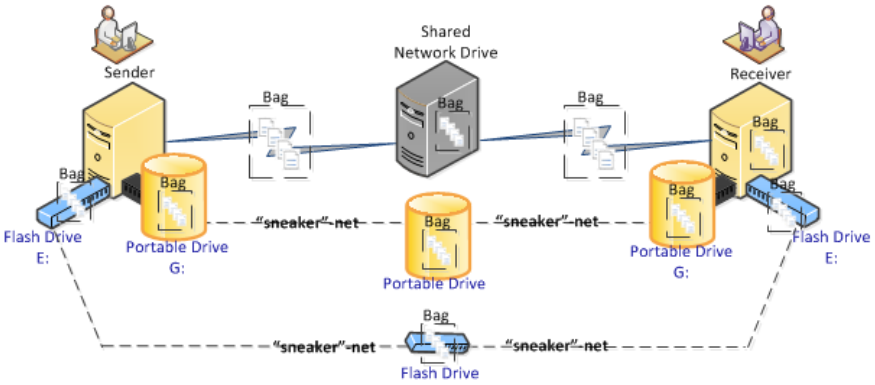
* How to Install and Use the BagIt Library to Create and Validate Bags

4/14/2011 (ver. 2.2)

Contents

Overview

As files are copied from one device to another, there is always the chance that the data may become corrupted. BagIt provides a program to reliably copy and transfer files between systems, which is important to ensure the validity and authenticity of the transferred files. For stewards responsible for the management of public records, it's critical to ensure that when transferring files from one system to another that they arrive intact and complete.



The above diagram illustrates two paths to transfer files from one system to another. You may choose to transfer your files via a removable flash drive, or directly to a shared network drive that both the sender and receiver have access.

BagIt provides two key features to facilitate reliable file transfers. It provides the ability to:

a. Package files into a "bag"
b. Verify that the contents of the "bag" have arrived unaltered after a copy and/or transfer.

BagIt is **a command-driven program**, that you will invoke through a **DOS command window,** and requires essentially two steps by the **sender** to prepare a bag of files to send to a receiver:

1. Use the BagIt "bag" command to **create** the bag that will hold several folders and/or files
2. Use the BagIt "bag" command to **verify** the bag's contents

The "bag" may be created on either a shared network drive or a removable storage device such as a USB-attachable portable disk or a flash drive.

The **receiver** will then copy the bag to her local storage using Windows Explorer, and then use BagIt to:

1. Use the BagIt "bag" command to **verify** the bag's contents

Once the bag's contents have been copied and verified, the receiver can use the familiar file copy tools offered through her familiar **Windows Explorer** interface to extract the files from the bag. No other tools are required to extract the files from the bag.

This user guide provides step-by-step instructions for the sender to create and verify a bag (Chapter 3), and for the receiver to verify and extract the files out of a bag (Chapter 4).

Software Required

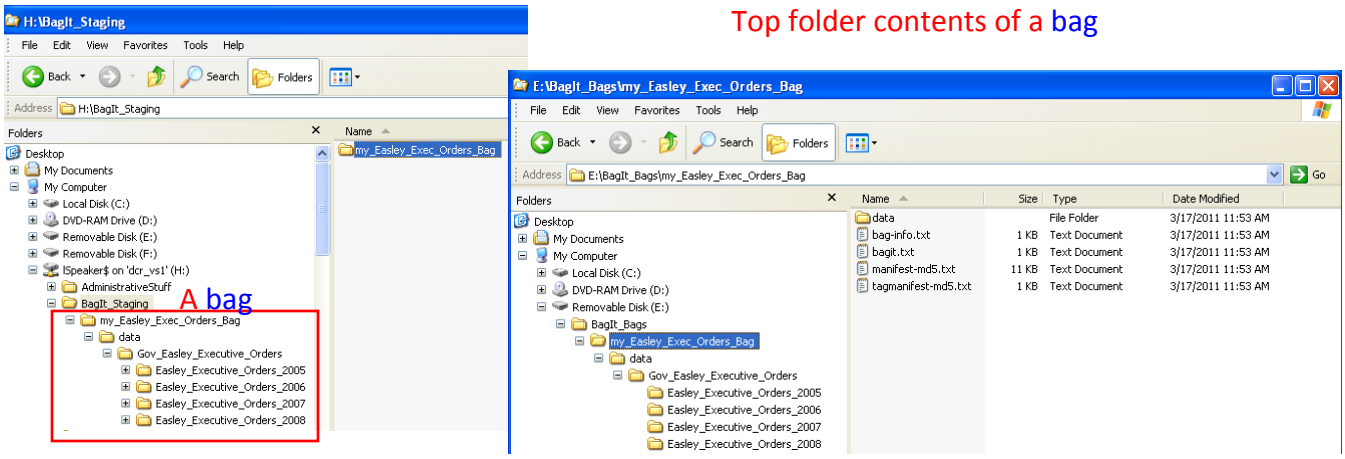
There are two software components that need to be installed to run BagIt:

1. Java Runtime Environment (JRE)
2. BagIt program

You will need **Administrator Rights** to install and configure the JRE and to install the BagIt program. Chapter 2 of this user guide provides a reference to where you can download the JRE, and step-by-step instructions for configuring the associated JAVA_HOME environmental variable. It also provides step-by-step instructions for downloading and installing the BagIt program. If you do not have Administrator Rights to your computer and/or are uncomfortable with installing or configuring software, **you may want to enlist the assistance of your IT support representative to install the software for you**. You can then move on the Chapter 3 or Chapter 4 to use the BagIt tool.

Introduction to the 'bag' Created by BagIt

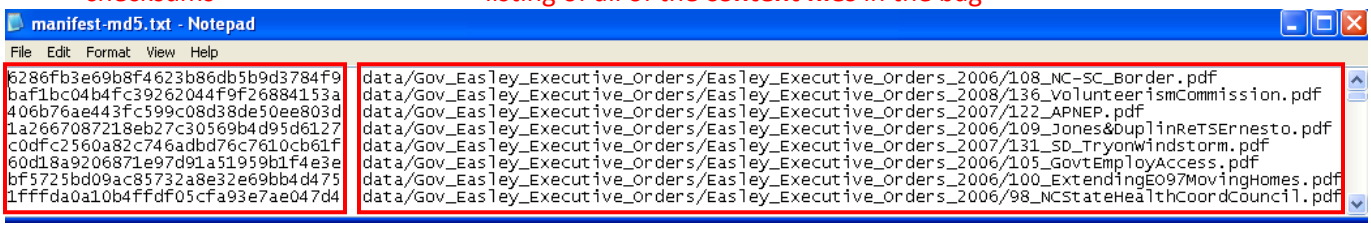
This section provides some additional background details on the "bag" that BagIt creates.



BagIt is a command-line utility used to package (bag) a collection of digital files for transfer. The content files are packaged (into a "bag") and stored under a folder called: data (BagIt refers to this directory as the "**payload**"). BagIt also produces four administrative files that hold the configuration and verification information for the files in the bag:

1. manifest-md5.txt: The text-based manifest of files for the bag that contains:

    1. An **inventory listing** of all the content files held in the bag (under the data folder)
    2. A **checksum** for each file.



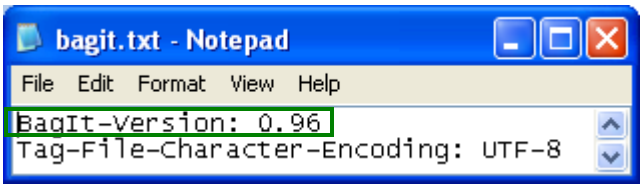
A **checksum**, also sometimes referred to as a "hash", is a machine-generated number based on the contents of the digital file that serves as a sort of "digital fingerprint" for the file. If the file is somehow altered, a newly generated checksum will not match the original checksum. BagIt uses a similar philosophy to verify the files in the bag. A checksum is generated for each file prior to transfer. The files are transferred, and then checksums generated for each of the files post-transfer. If a checksum does not match, this indicates that the file has been somehow altered.

BagIt's *verifyvalid* option performs two types of verifications on a transferred bag:

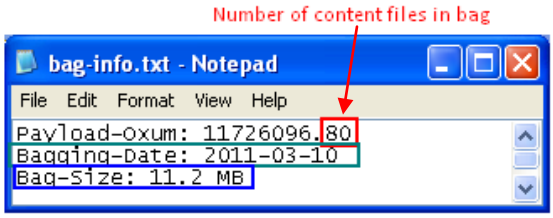
a. It makes sure that the bag is ***complete***, meaning that every file that is listed in the manifest is present in the collection of content files in the bag.

b. It makes sure that the post-transfer generated ***checksums*** for each file listed in the manifest matches the pre-transfer checksum.

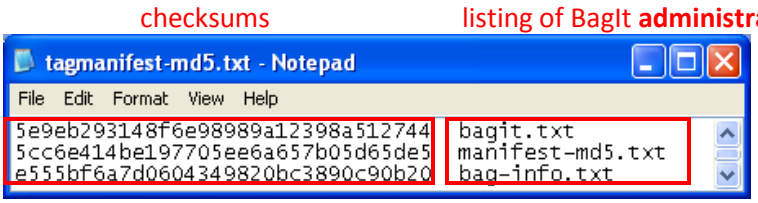
2. bagit.txt: provides the version of BagIt



3. bag-info.txt: provides the number of files in the bag, the date the bag was created, and the size of the bag.



4. tagmanifest-md5.txt: provides the checksums for the BagIt Administrative files, to ensure that these are not altered during the transfer.

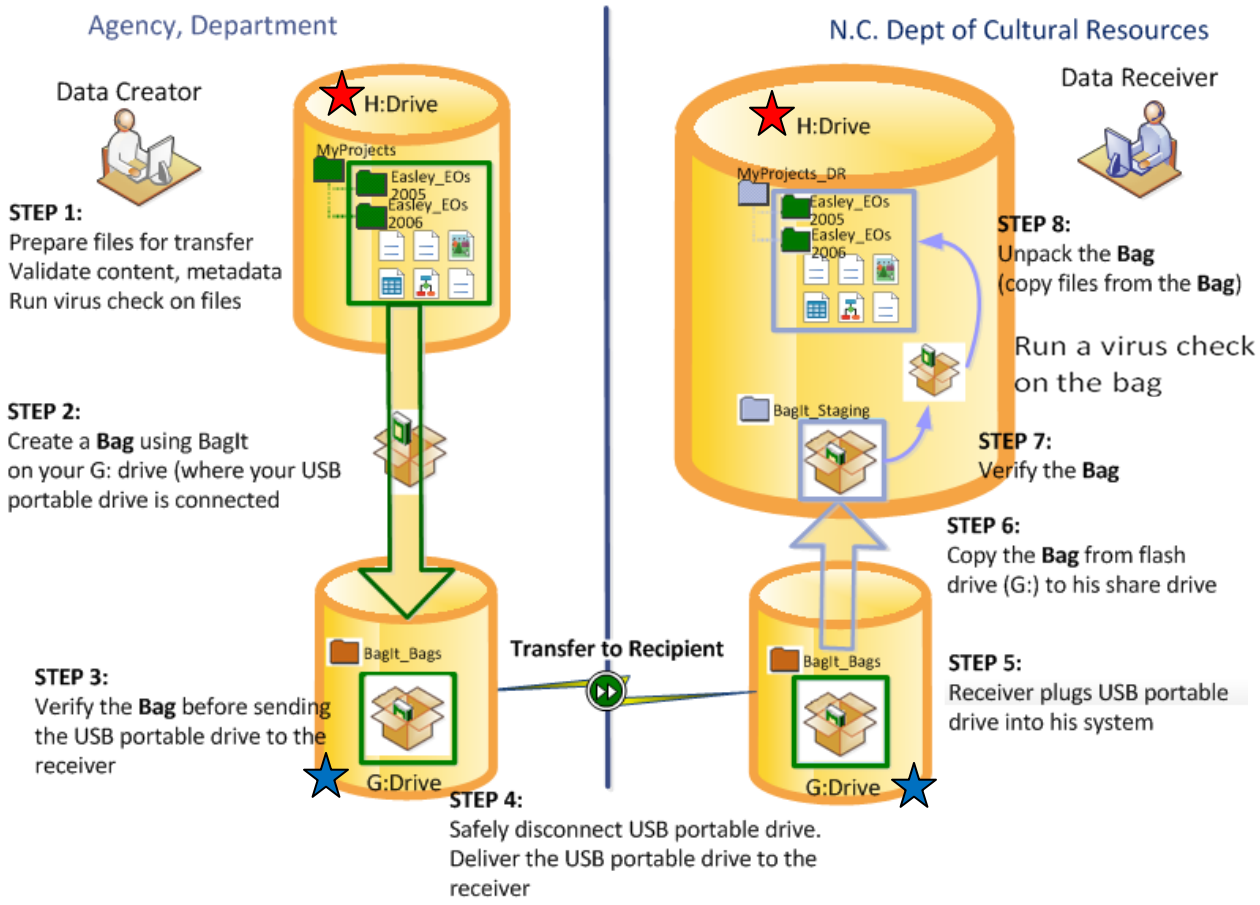


Data Transfer Example Overview

This section describes and illustrates the sender's processes of creating a bag on a remote storage device and verifying a bag, and the receiver's processes of receiving, verifying and unpacking a bag. The folders and files illustrated in the diagram correspond to the step-by-step instructions in Chapter3 and Chapter 4.

To perform a data transfer and verification using BagIt, a user creates a bag using the bag command, verifies the bag using the bag *verifyvalid* option, and transfers the bag, which is essentially a file folder, to a receiver. The bag contains the files the user wants to transfer. The receiver copies the bag to his local system, and then uses the bag *verifyvalid* option to validate the integrity of the files was maintained through the transfer process. He then simply uses basic operating system file manipulation mechanisms (e.g. Windows Explorer) to copy or move the files from the bag to their desired destination on the receiver's system. No special software tools are required to extract files from the bag, as is the case with zip and tar.

If the bag and its general structure are maintained, and a copy of a file is pulled from the bag, the file can later be re-validated by inserting it back into the bag. Of course, if you do this, you'll want to make a "safe" copy of the original bag file, prior to overwriting it with the file you are validating.



NOTE: While the illustration and code examples use **H:** drive, your personal network drive may be mapped to a different letter.

NOTE: The **G:** drive represents a removable disk device (e.g. a USB-attachable portable disk device or a flash drive) or a shared network drive that both the Data Creator and Data Receiver can access. Bags, therefore, can be transferred via "sneakernet" or via the network. If you transfer files via a USB flash drive, you may see it attached to the **E:** Drive on your computer.

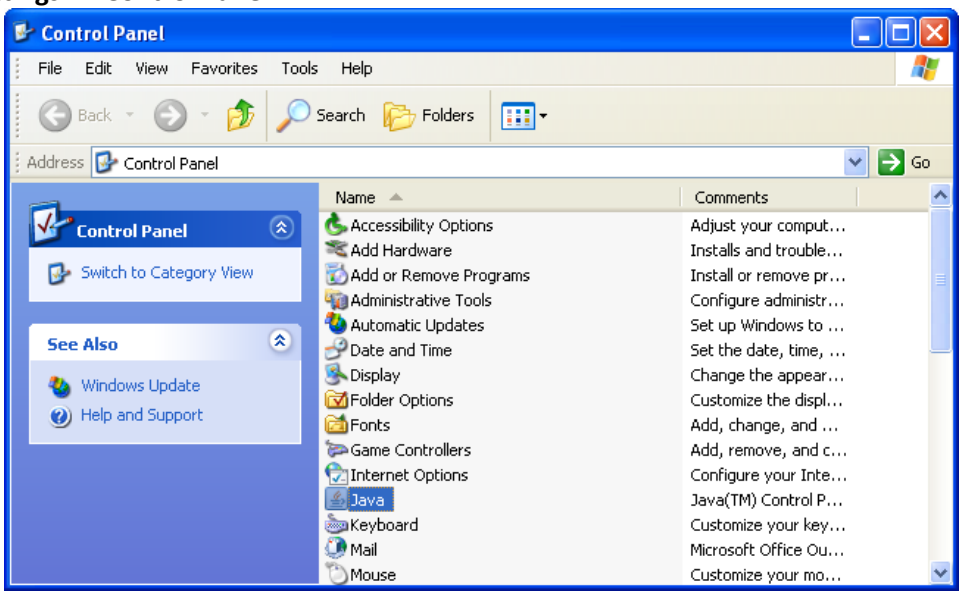
Installing BagIt

1. Installing Java Runtime Environment (JRE)

1.1 Check for JRE, Download and Install JRE
Prior to installing BagIt you will need to have a Java Runtime Environment (JRE) installed on your computer. You will need **Administrator Rights** on your computer to install the JRE. Contact your ITS support person if you do not have access, or feel uncomfortable installing and/or configuring software.

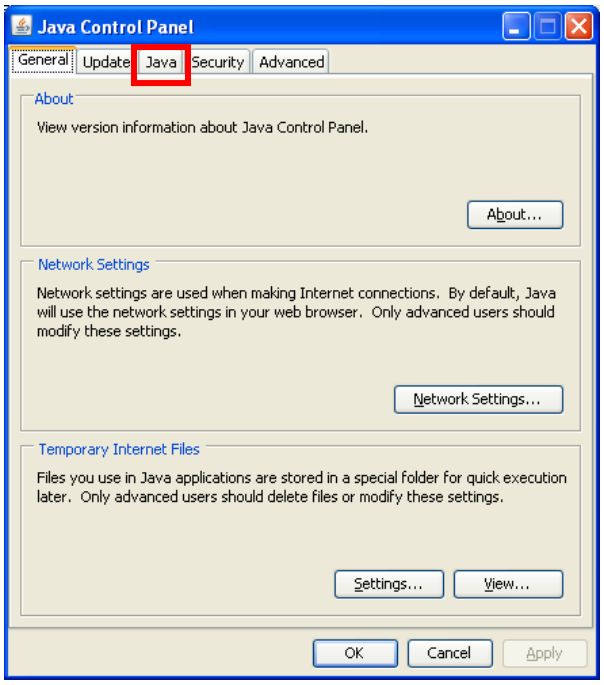
1.1.1 You can check your computer to see if you have a JRE installed by selecting:

Start -> Settings -> Control Panel



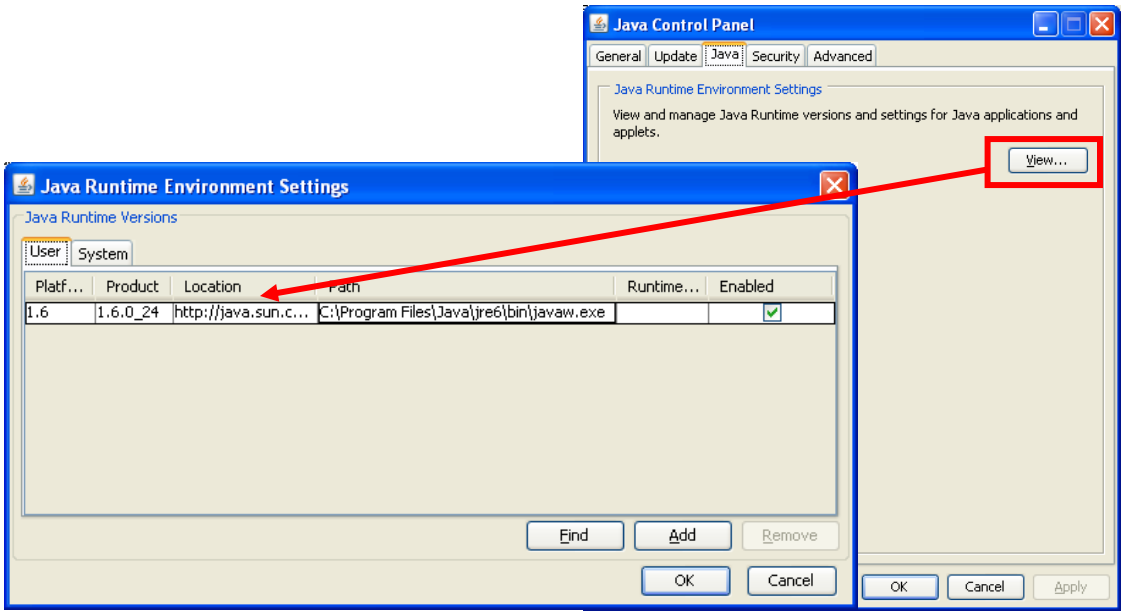
Look to see if you have a **Java** item in your list.

Double-click on **Java** to open the Java Control Panel



Select the **[Java]** tab to view the screen that provides access to the Java Runtime Environment Settings

Select the **[View...]** button, and this will display the Java Runtime Versions you have installed



This displays what version (1.6.0_24) and the installation location.
If it appears that you have a JRE installed, skip down to step 1.2 to confirm that the JRE environmental variable is defined.

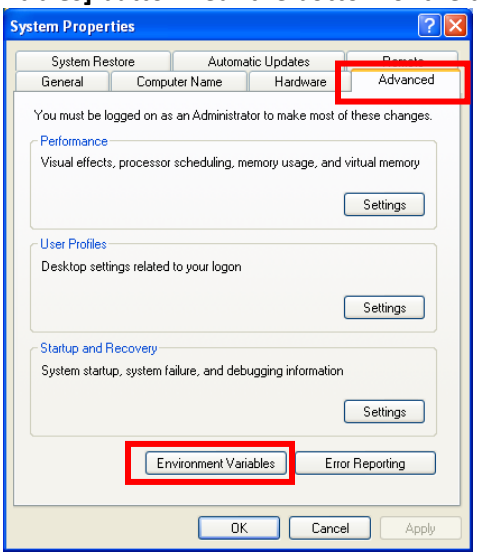
1.1.2 If you do not have a JRE installed, you can download it from:

1. Oracle: http://www.oracle.com/technetwork/java/javase/downloads/index.html
2. CNET: http://download.cnet.com/Java-Runtime-Environment-JRE/3000-2356_4-10009607.html
   Note: this document was written using JRE 6 Update 23.

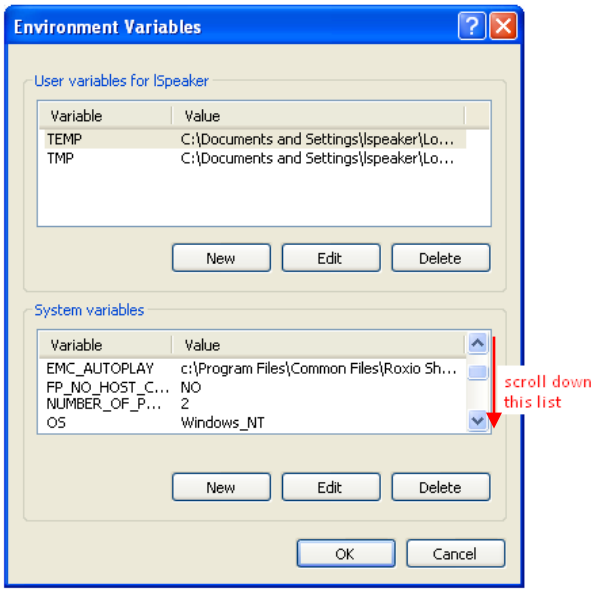
Note the JRE is generally installed to the C:\Program Files folder.

1.2 Configuring JRE environmental variable

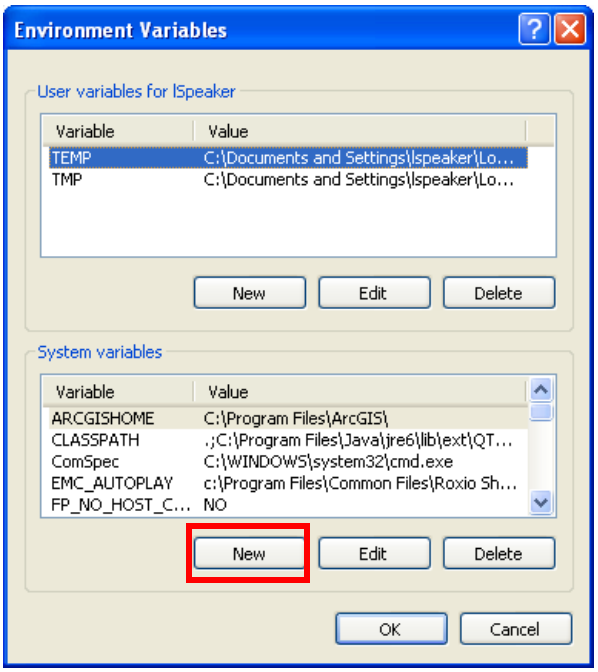
a. Find the **My Computer** icon on your desktop.
b. Using the right-mouse-button menu, select the **Properties** option.
c. Select the **[Advanced]** tab.
d. Select the [**Environment Variables]** button near the bottom of the dialog box.



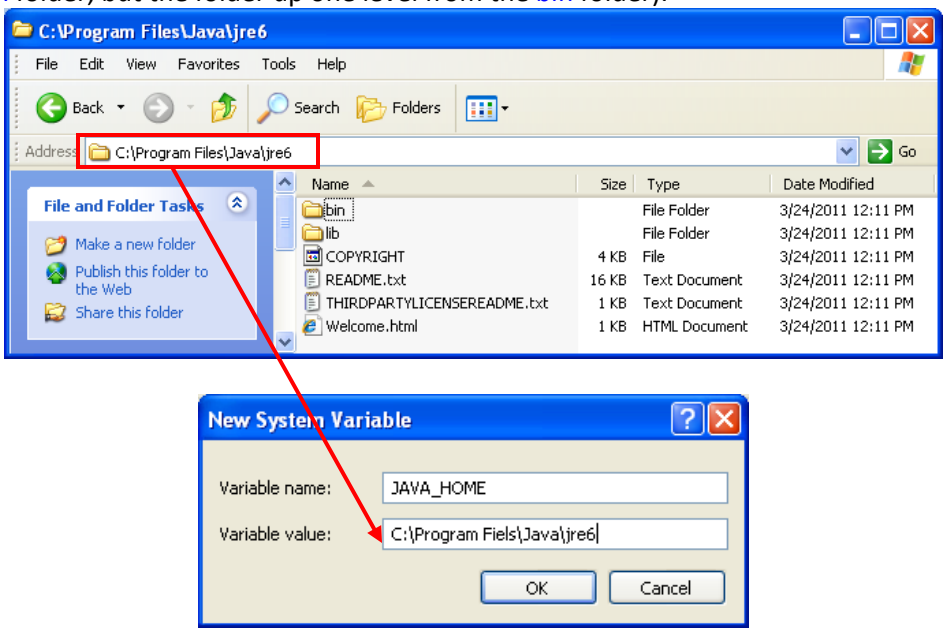
e. An **Environment Variables** window will appear.
First verify that the JAVA_HOME environment variable is **not** defined.
The **Environmental variables** are listed alphabetically. Scroll down the list, until you see where the environmental variables would be listed that start with J. In the example below, there is no JAVA_HOME variable listed in this display, so it is not yet defined. We will create it in the following steps.



f. To create a new Environmental variable, select the **[New]** button in the lower half of the window.

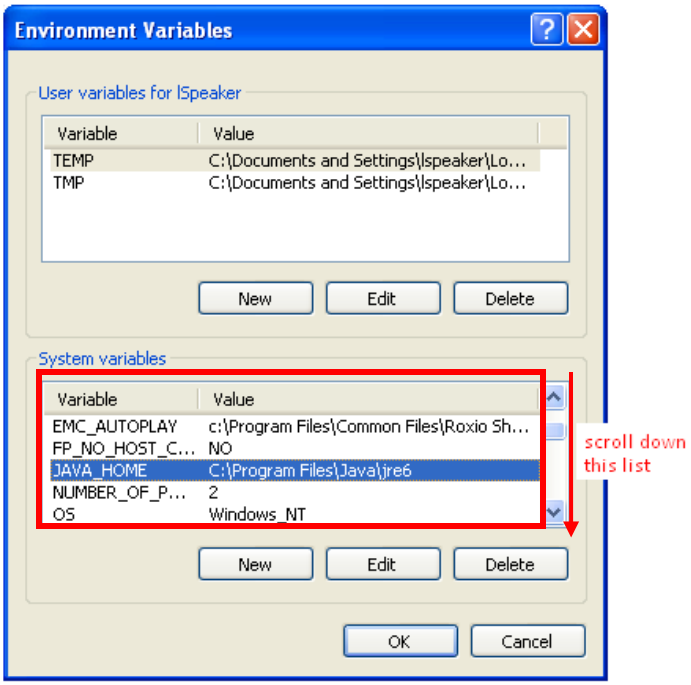


g. A **New System Variable** window will appear.
In the ***Variable name*** field, type JAVA_HOME
In the ***Variable value*** field, type the complete path to the folder that contains the JAVA bin folder, the lib folder, and the COPYRIGHT file. This will be **above the** bin folder that contains java.exe (Note: this will **not** be the bin folder, but the folder up one level from the bin folder).



Click **[OK]** to close the **New System Variable** window

h. Review the list of **System variables** and verify the JAVA_HOME variable is there.
The ***System variables*** are listed alphabetically in the lower window. Scroll down through your list of ***System variables*** to confirm the **JAVA_HOME** variable was properly assigned.



Click **[OK]** to close the **Environment Variables** window.

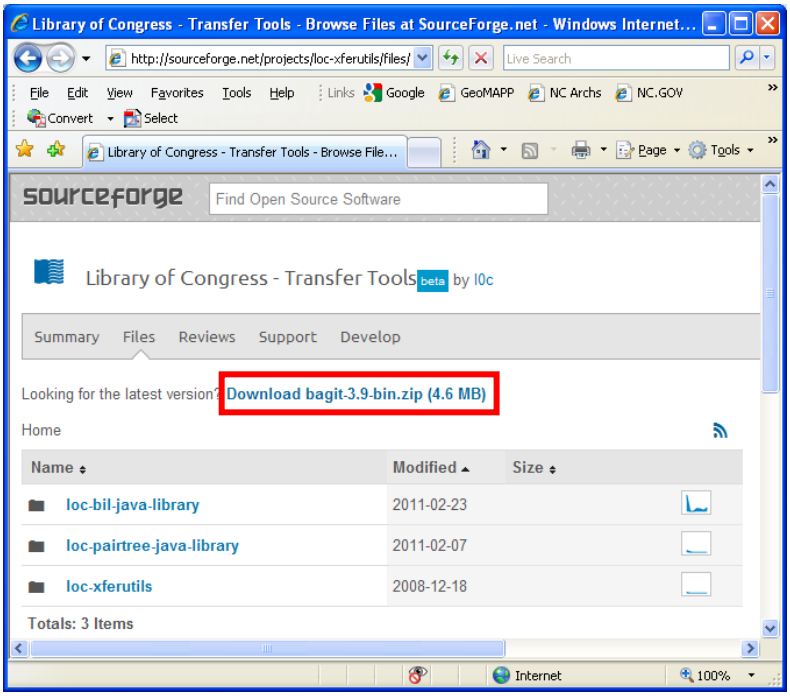
Click **[OK]** to close the **System Properties** window.

2. Installing BagIt

You will need **Administrator Rights** on your computer to install BagIt. Contact your ITS support person if you do not have access, or feel uncomfortable installing and/or configuring software.

2.1 To access the latest BagIt code, open a web browser window and navigate to the SourceForge Library of Congress Transfer Tools page:

http://sourceforge.net/projects/loc-xferutils/files/



2.2 Select the "**Download bagit-3.9-bin.zip (4.6 MB)"** link to download the most recent BagIt binary (#.#-***bin***.zip) code distribution from SourceForge. These instructions describe how to install the **binary** version of BagIt which installs a run-ready application. SourceForge also provides the source code for BagIt (#.#-***src.***zip).

The download process may request you to enter your contact information.

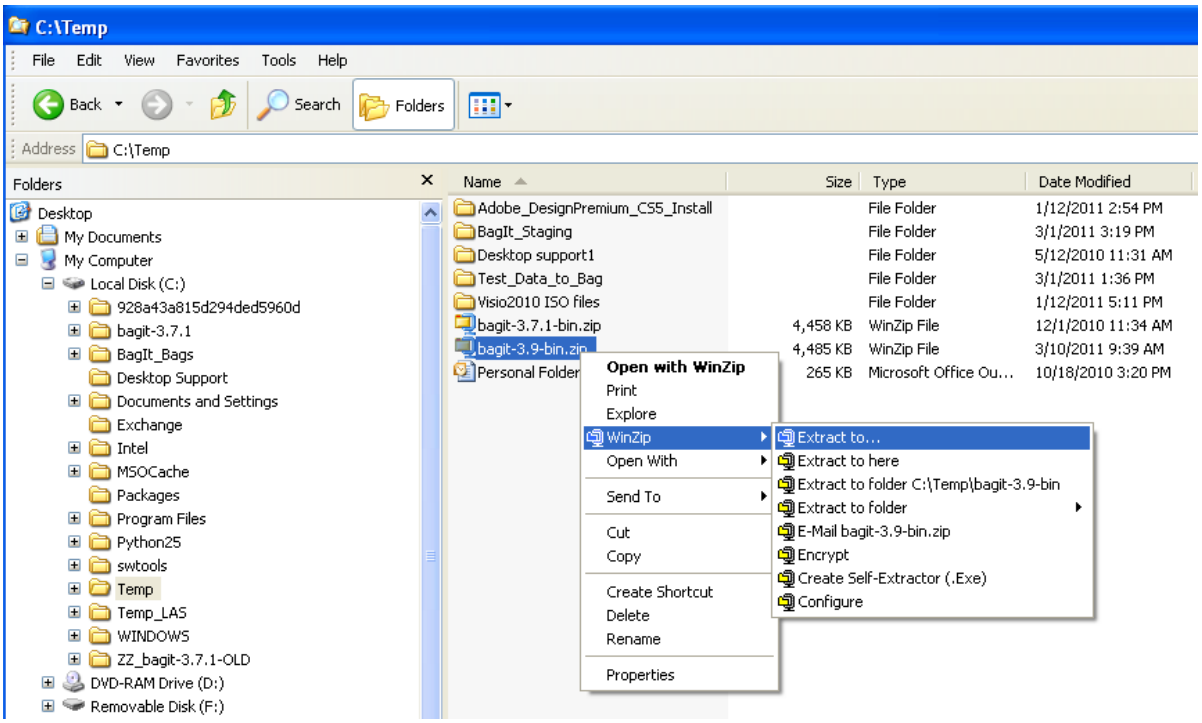
2.3 The **File Download** window will appear, prompting you to either open or save the file. Select the **[Save]** option.

2.4 Select the folder you want to save the zip file. Select your **C:** folder.
NOTE: You will need **Administrator rights** on your computer to be able to create a new directory under C:\

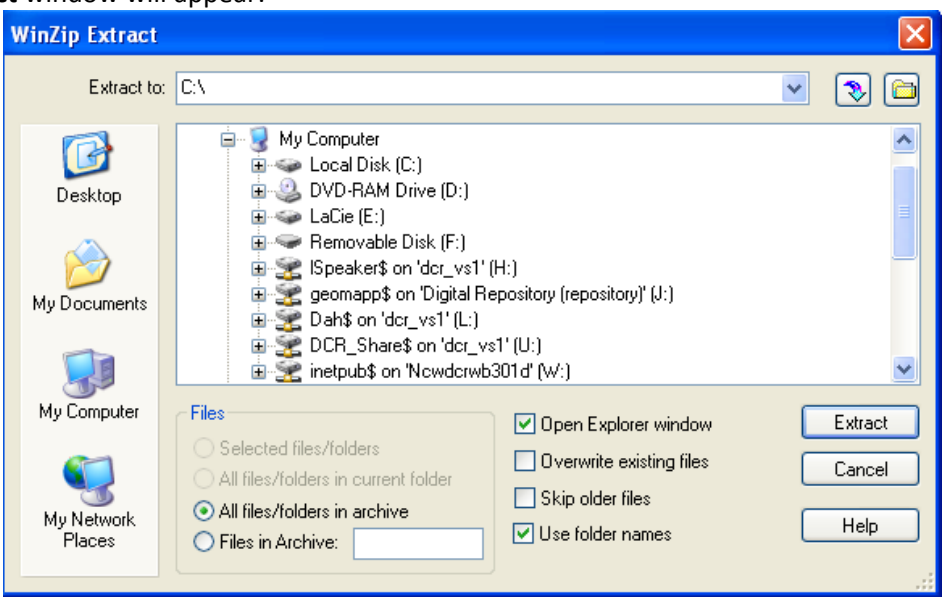
However, you may install BagIt to any directory, as you will be running BagIt from a command window, and you will first change directory to BagIt's bin directory to run the command. So, if you are restricted from installing new files to your C:\ directory, choose another directory for which you have write access (e.g. C:\Temp or a directory on your sharedrive).

2.6 To extract the files from the zip package, open a **Windows Explorer** window, and open your **C:** folder

a. If you have **WinZip** installed, select the bagit-3.9-bin-zip, and with the *right-mouse-menu* select **Winzip->Extract to**



A **WinZip Extract** window will appear:



In the ***Extract to:*** field, enter: **C:** (if your target folder does not exist, WinZip will create it for you)

Select options:

All files/folders in archive

Open Explorer window

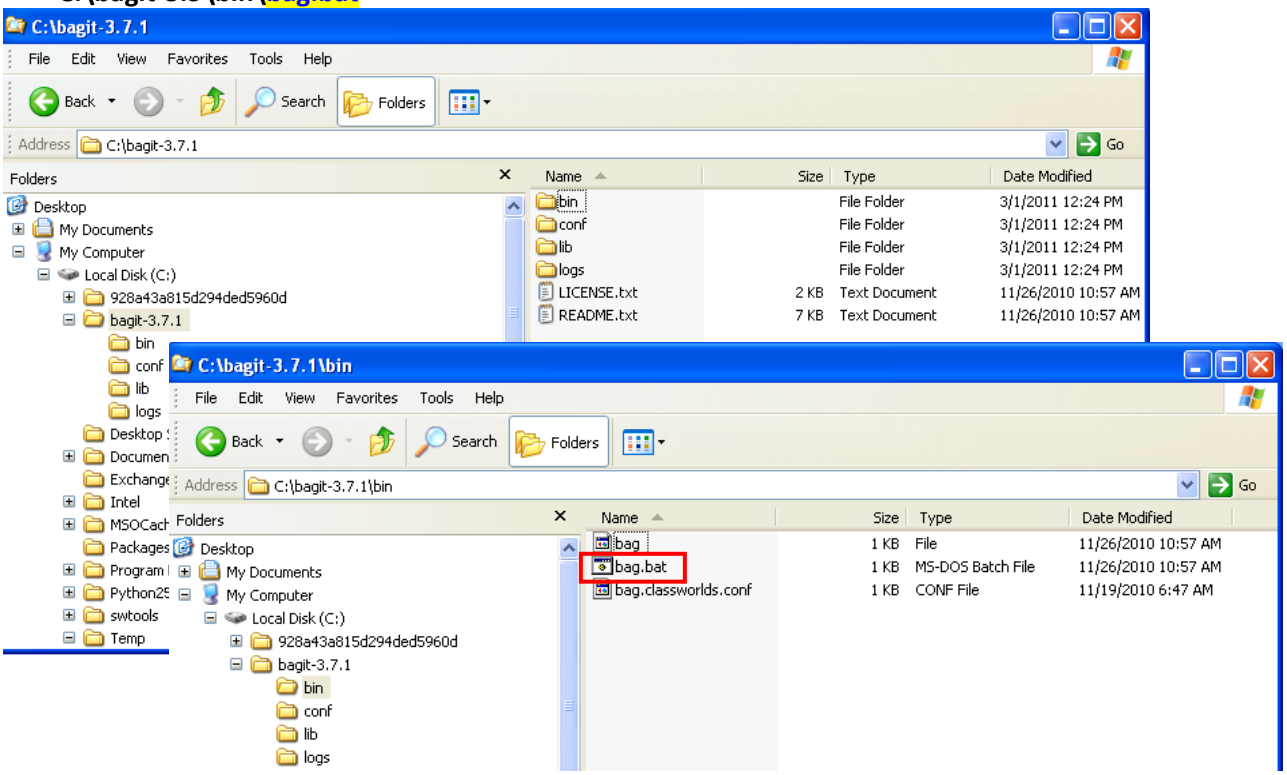
Use folder names

Select:

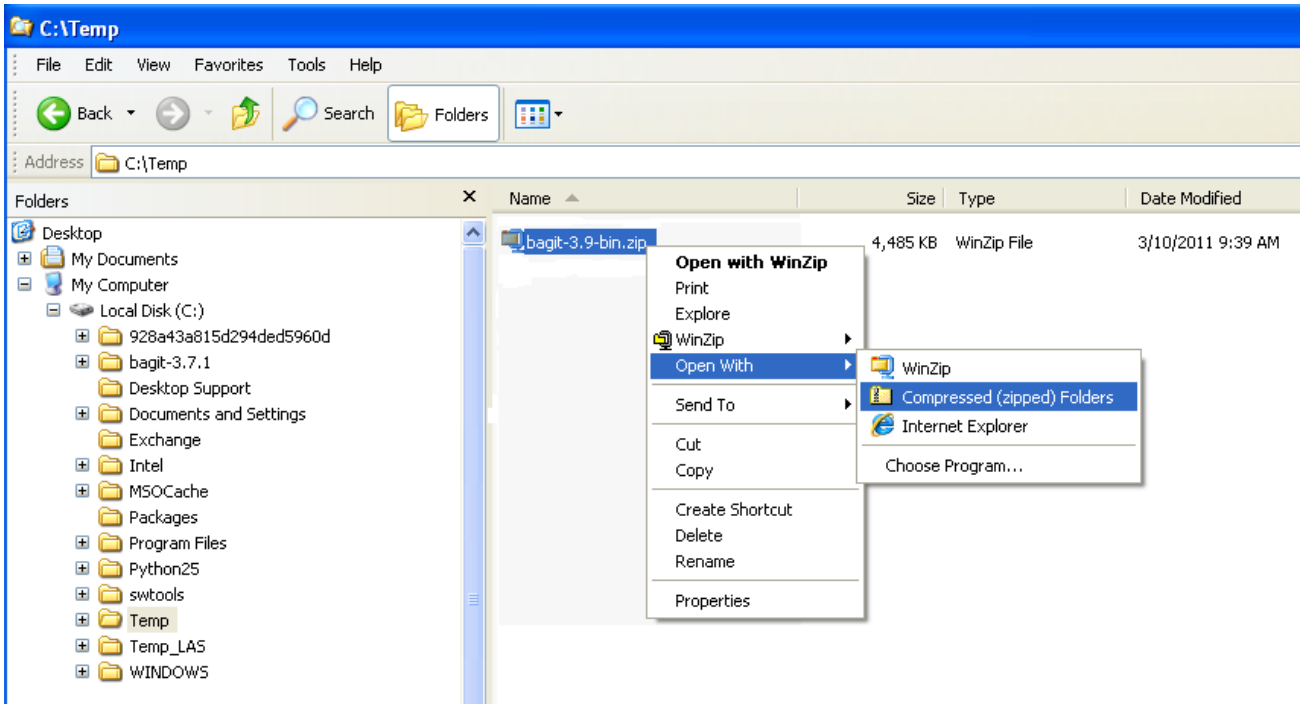
[Extract]

A new window will open displaying the contents of the **C:** folder

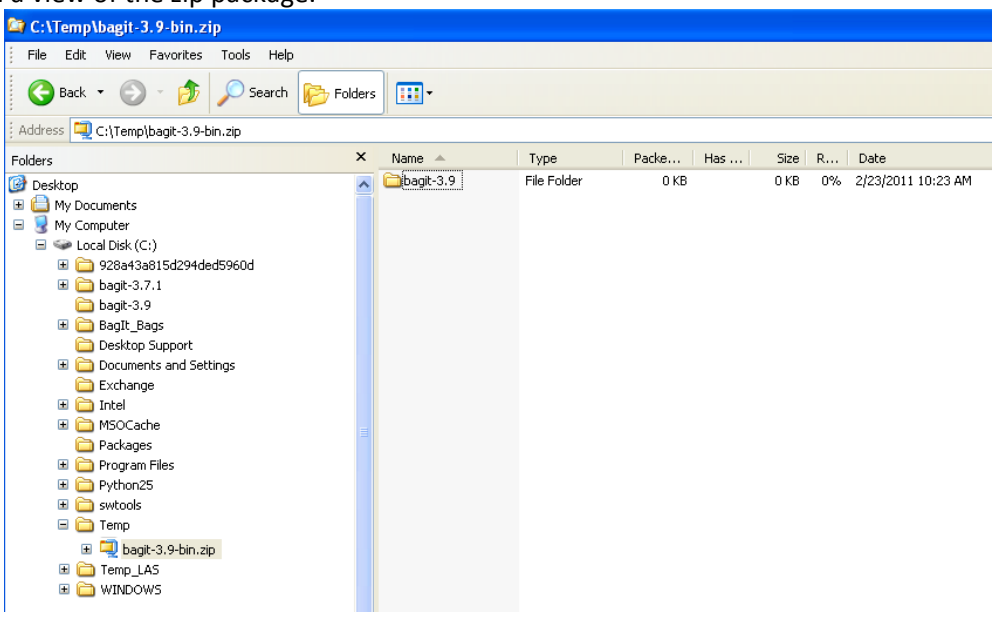
Navigate down the folder to verify that you see the extracted files, specifically the file:
C:\bagit-3.9\bin\bag.bat



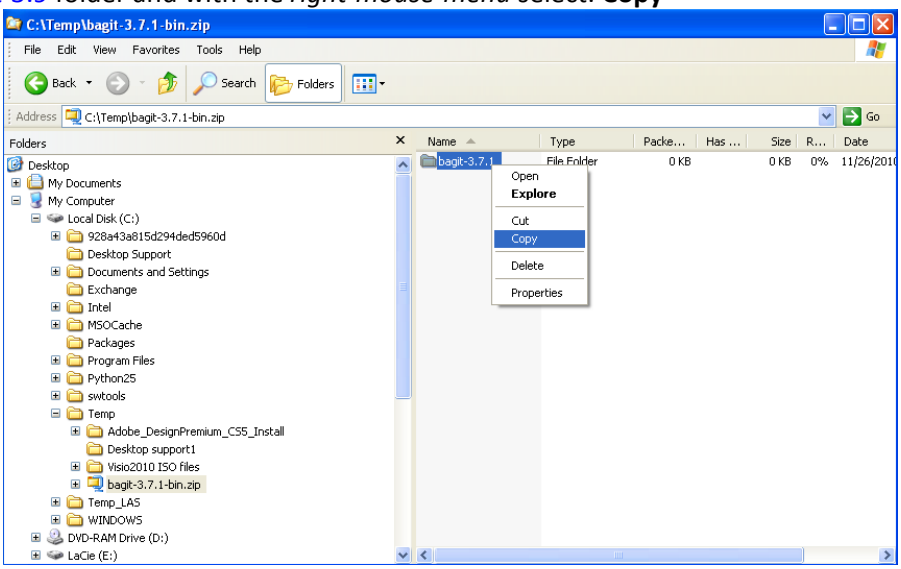
b. If you **don't** have WinZip and are running on a Windows system that supports reading zipped files: select the bagit-3.9-bin-zip, and with the *right-mouse-menu* select:
Open With -> Compressed (zipped) Folders



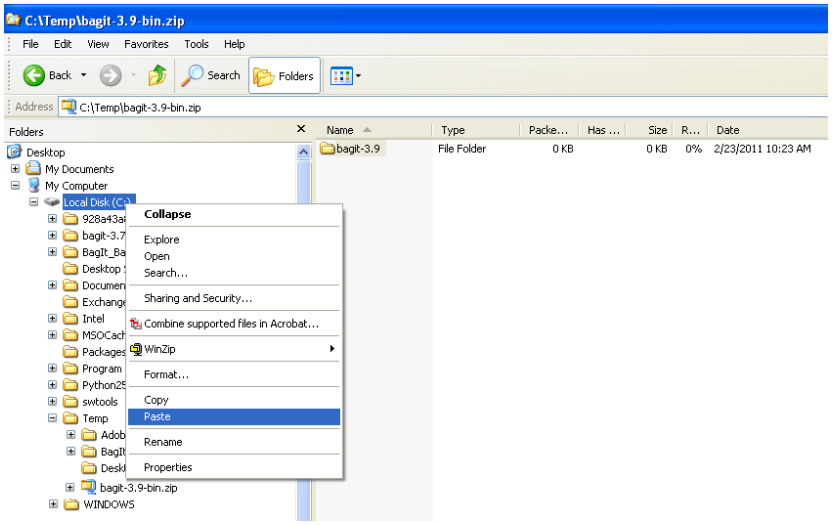
This will open a view of the zip package.



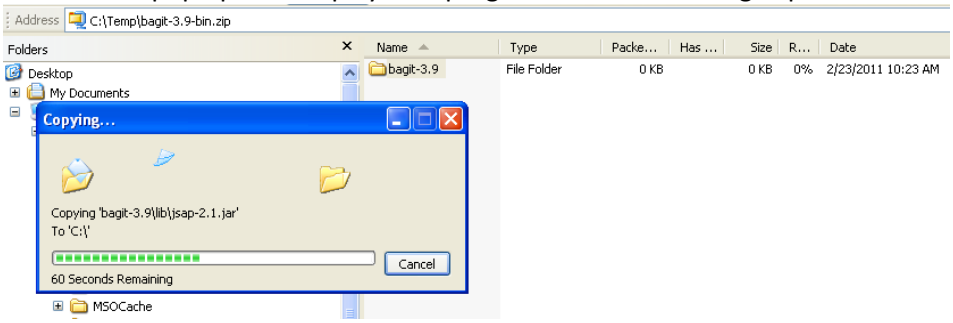
Select the bagit-3.9 folder and with the *right-mouse-menu* select: **Copy**



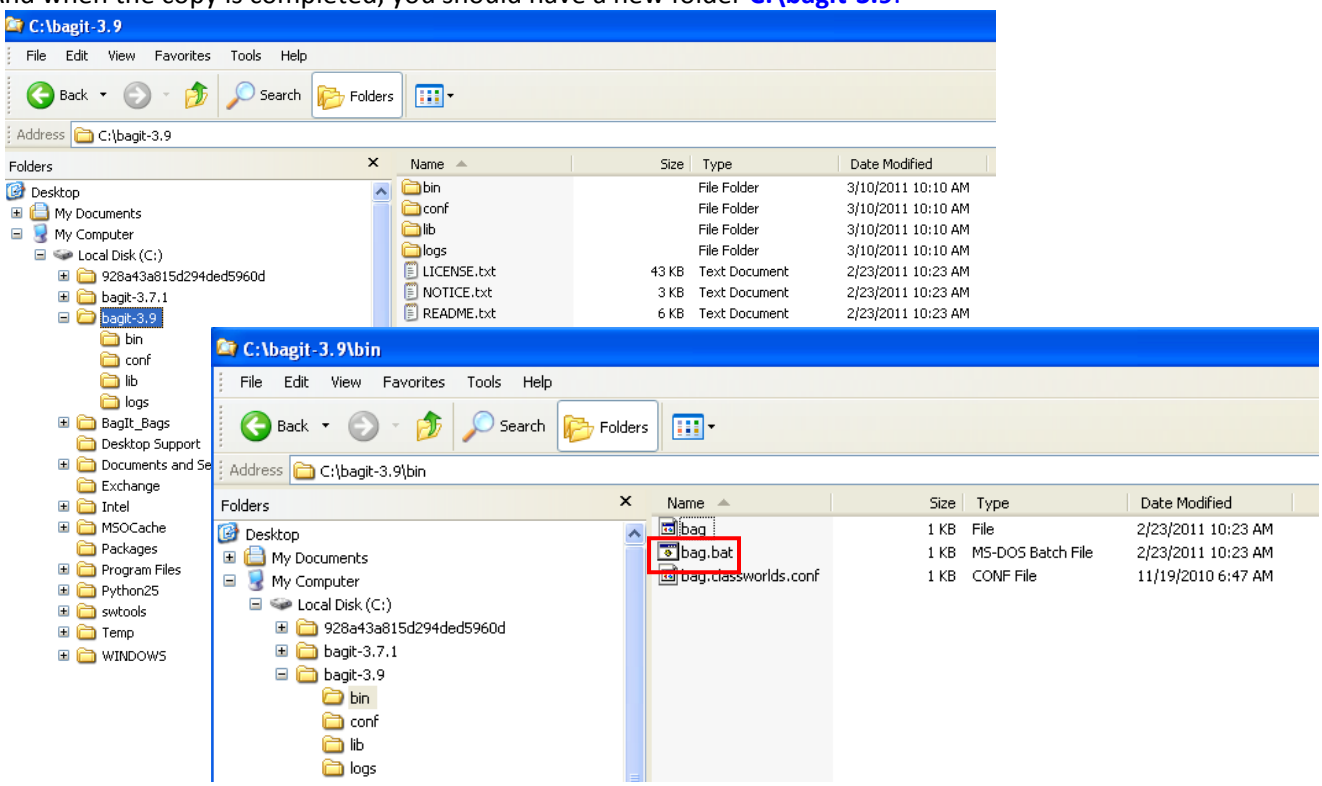
Click on the **Local Disk (C:)** folder, with the *right-mouse-menu* select: **Paste**



You should see a window pop up that displays the progress of the files being copied:



And when the copy is completed, you should have a new folder **C:\bagit-3.9**:

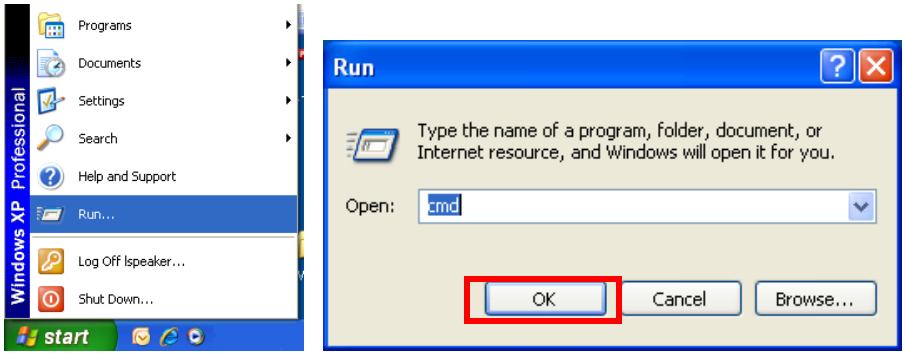


Navigate down the folder to verify that you see the extracted files,
specifically, **the C:\bagit-3.9\bin\bag.bat** file.

3. Using BagIt to Create a Bag to Transfer

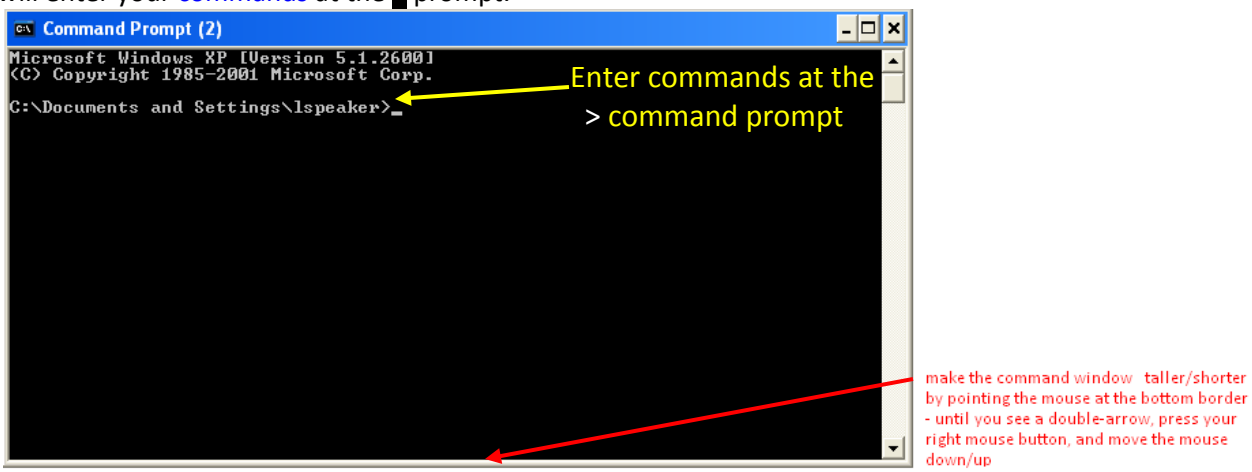
3.1 BagIt is a command-driven utility

You will need to open a DOS command window. Click the **[Start]** button in the lower left corner of your display, and select **Run...** from the menu. The **Run window** will appear. Type **cmd** in the ***Open:*** field, and click **[OK].** This will bring up a DOS command window.



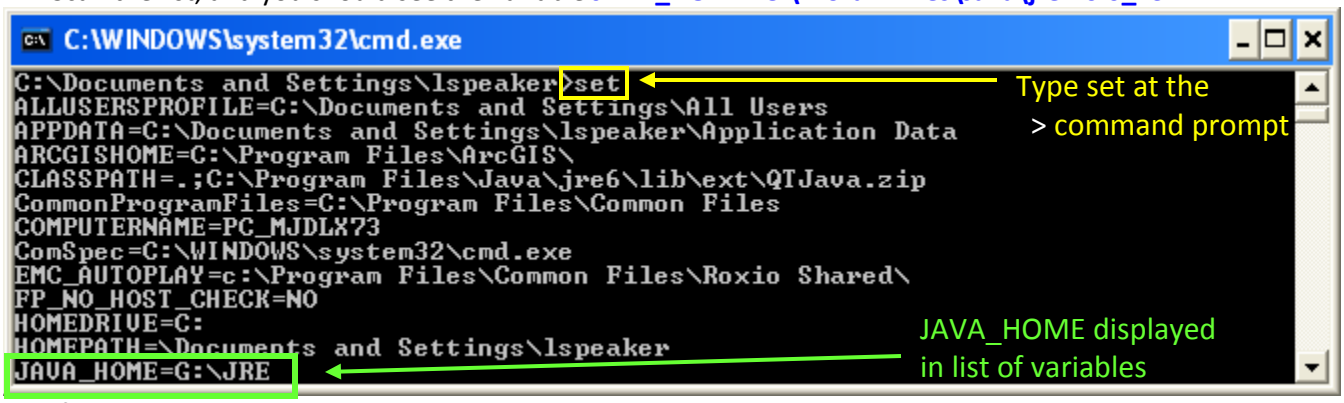
3.2 The DOS command window:

will likely default to your local **C:\Documents and Settings** directory.
You will enter your commands at the > prompt.



3.3 Verify that your JAVA_HOME environment variable is set

by typing the command at the > command prompt: **set**
Scan the list, and you should see the variable **JAVA_HOME=C:\Proram Files\Java\jre1.6.0_23**

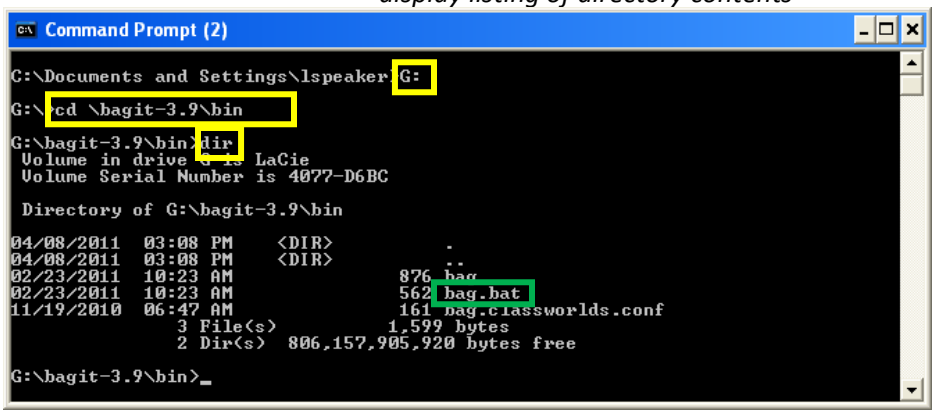


If you do not see the **JAVA_HOME** variable, return to step 1.2 in the installation instructions section to configure the environmental variable. You will need **Administrator access** to assign the **JAVA_HOME** variable.
Note: In the example above and below, the JRE program and the BagIt proram are installed on the portable disk device connected to the G: drive.

3.4 Change directory (cd) to where your bag.bat batch file is located

NOTE: On your personal computer, the folder levels are separated by '**backslashes**' (****) rather than forward slashes (/). Type in the following 2 commands at the **>** command prompt:

G:	*changes command 'focus' to the G: drive*
cd \bagit-3.9\bin	*change directory*
dir	*display listing of directory contents*

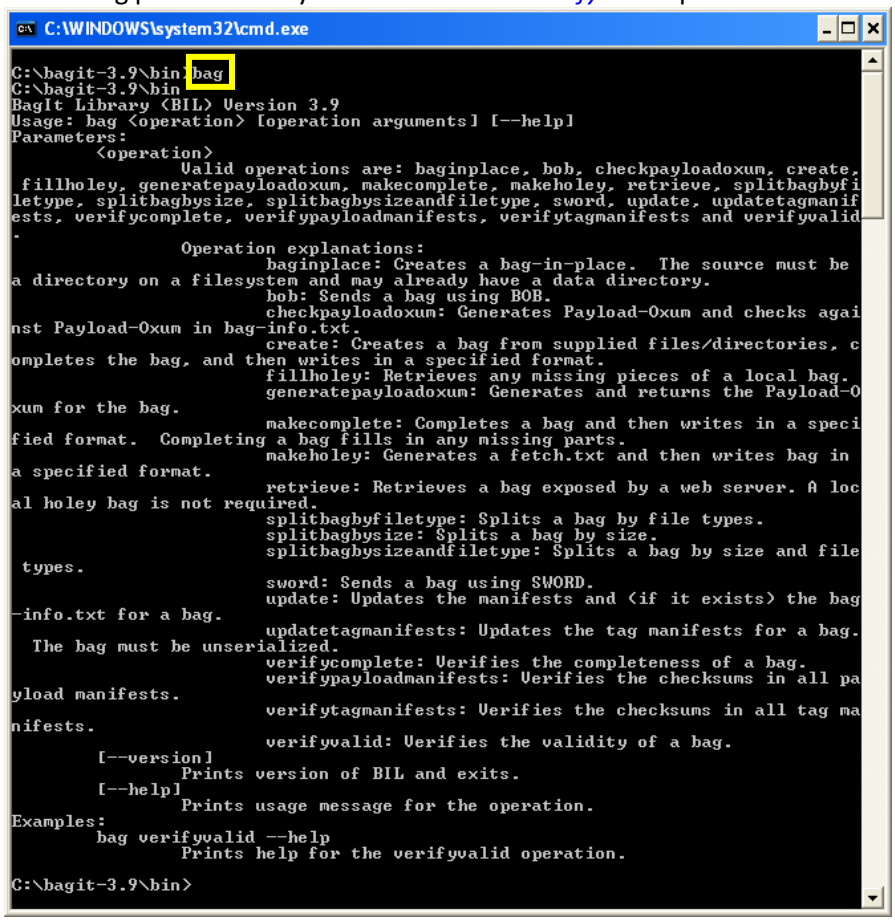


You should see the **bag.bat** batch program in the directory listing.

3.5 At the **>** command prompt, type **bag**, and press **[Enter].**

A list of all valid options for this batch program will be displayed.

NOTE: We will be focusing predominately on the *create* and *verifyvalid* options



Note: to learn more about each individual option and its parameters, from the command prompt, type:

bag[space]<*option*>[space]--help

For example, to learn more about the verifyvalid option, enter:

bag *verifyvalid* --help

3.6 To create and verify a bag:

At the time of preparing this user guide, BagIt does not support a graphical user interface. To run the BagIt program, you will need to use a DOS command window, and enter the bag command with the appropriate options for the type of operation you want to perform.

NOTE: We will be focusing predominately on the *create* and *verifyvalid* options of the bag command

a. The general command to **create** a bag:

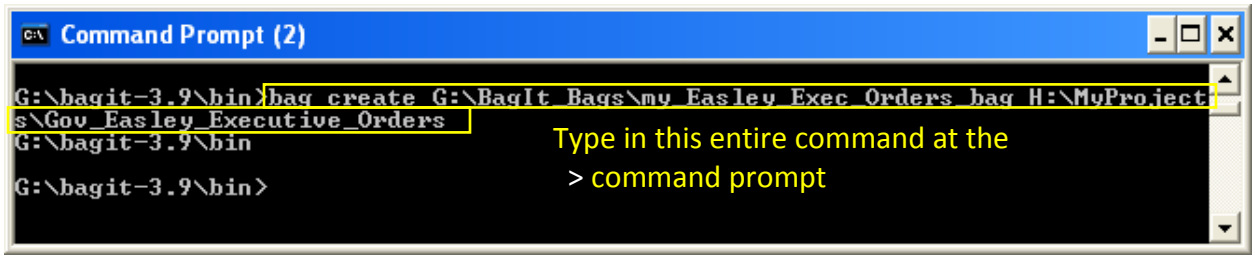
bag[space]create[space]<*name of bag to create* - including the full path>[space]<*files you want to bag* - including full path to the directory containing the source files you want to bag>

Note: You will need to give the bag an appropriate name when you enter the command.
The BagIt utility does not automatically create or assign a bag name. We recommend that you append _Bag to the end of the bag name

Example:

I want to *create* a bag with all of the Governor Easley Executive Order files.
They are stored in the folder:
H:\MyProjects\Gov_Easley_Executive_Orders
I want to bag all of the files under the folder: H:\MyProjects\Gov_Easley_Executive_Orders
I want the bag created on my removable USB flash drive mounted at G: under the directory G:\BagIt_Bags

bag create G:\BagIt_Bags\my_Easley_Exec_Orders_bag H:\MyProjects\Gov_Easley_Executive_Orders



Note: You can include several directories in a single bag. Just provide the complete path to each directory separated by a space.

bag create G:\BagIt_Bags\my_NC_Govs_Exec_Orders_bag H:\MyProjects_2009-now\Gov_Perdue_EOs H:\MyProjects_2001-09\Gov_Easley_EOs H:\MyProjects_1993-2001\Gov_Hunt_EOs H:\MyProjects_1985-1993\Gov_Martin_EOs

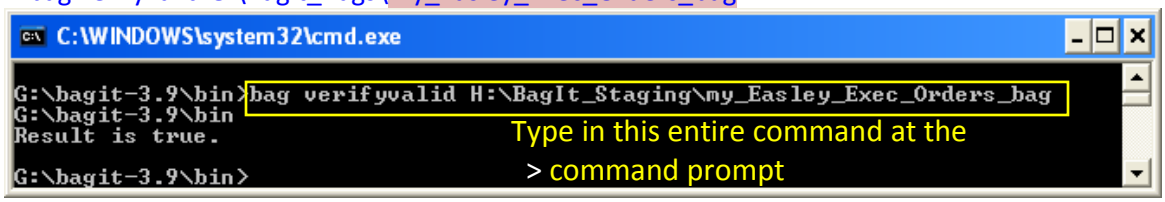
b. The general command to **verify** a bag:

bag[space]verify[space]<*name of bag to verify* - including the full path>

Example:

I want to *verifyvalid* the my_Easley_Exec_Orders_bag bag. The bag is stored in the folder:
G:\BagIt_Bags
I want to verify the bag created above that is found at: G:\BagIt_Bags\my_Easley_Exec_Orders_bag

bag verifyvalid G:\BagIt_Bags\my_Easley_Exec_Orders_bag

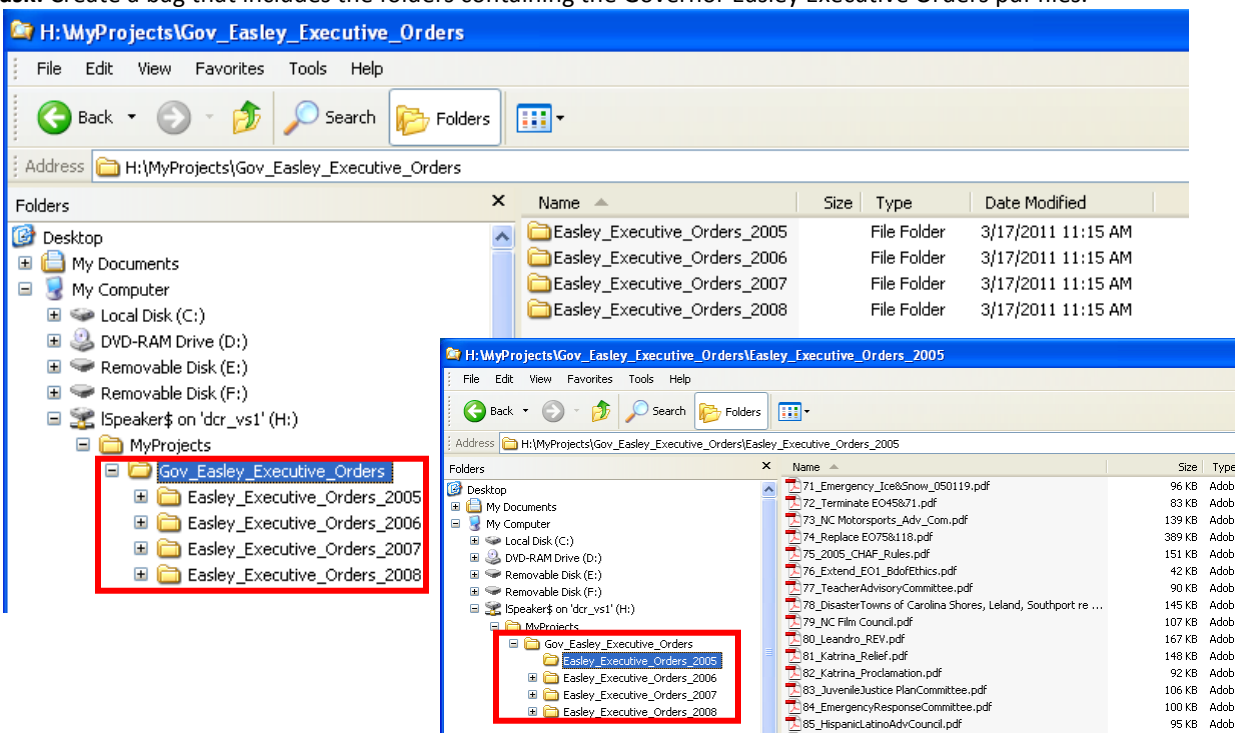


Detailed step-by-step instructions of running these commands in conjunction with managing the associated directories are included on the following pages.

Creating a Bag Example in Detail:

GOAL: Create a **bag** containing all of the folders and files in the H:\MyProjects\Gov_Easley_Executive_Orders folder:

Task: Create a bag that includes the folders containing the Governor Easley Executive Orders pdf files.



Example Detailed Instructions:

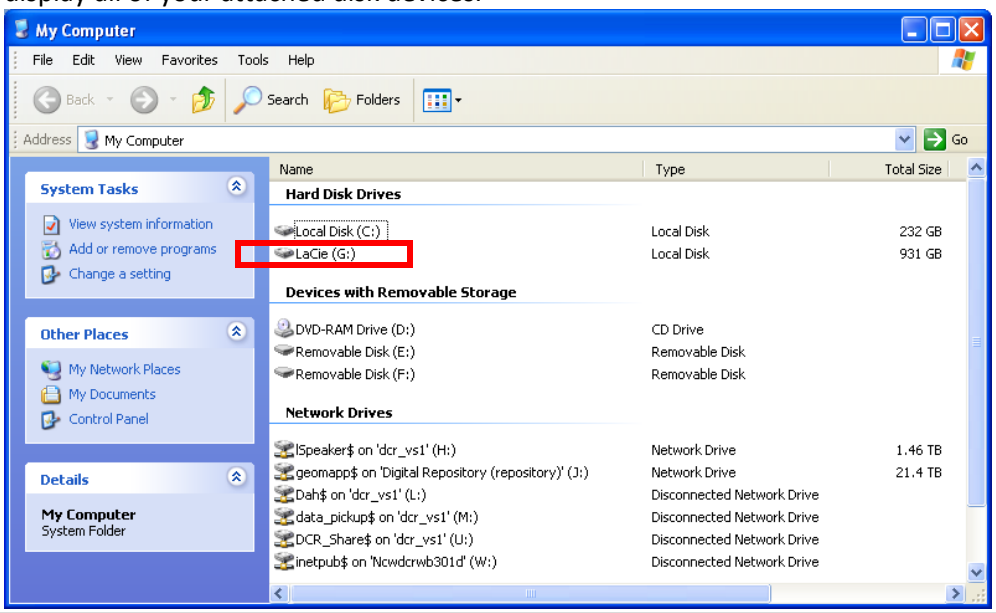
1. Create a new folder on your **G:** USB-attachable portable disk drive called **G:\BagIt_Bags** to hold the newly created bags.

   Note: If you are creating your bag on a USB-attachable flash drive, that may connect to the **E:** or **F:** drive

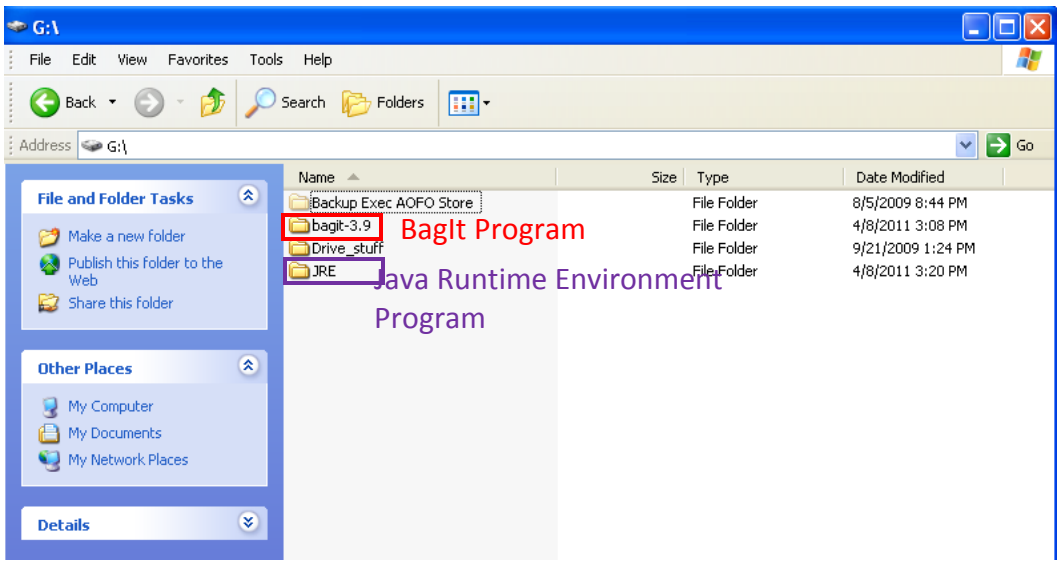
   Note: If you are creating your bag on a network-shared drive, that may connect to the **I**: or **J:** drive

1.1. FIRST - Attach your USB-attachable portable drive to a USB port on your computer.

1.2. Double-click on your **My Computer** icon on your desktop. This will open the **My Computer** window, and display all of your attached disk devices.

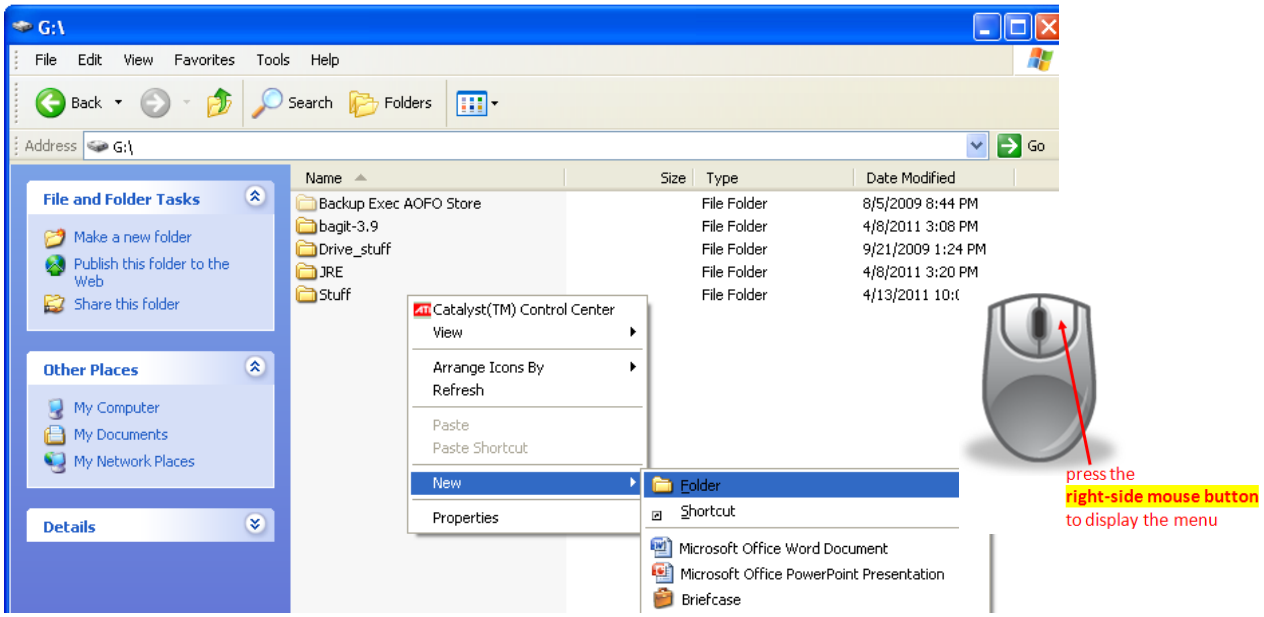


1.3. Double-click on the **Hard Disk Drive (G:)** icon. This will open a view of your G: drive
Note: your portable disk may attach to another available Hard Disk Drive drive letter other than **G:.**

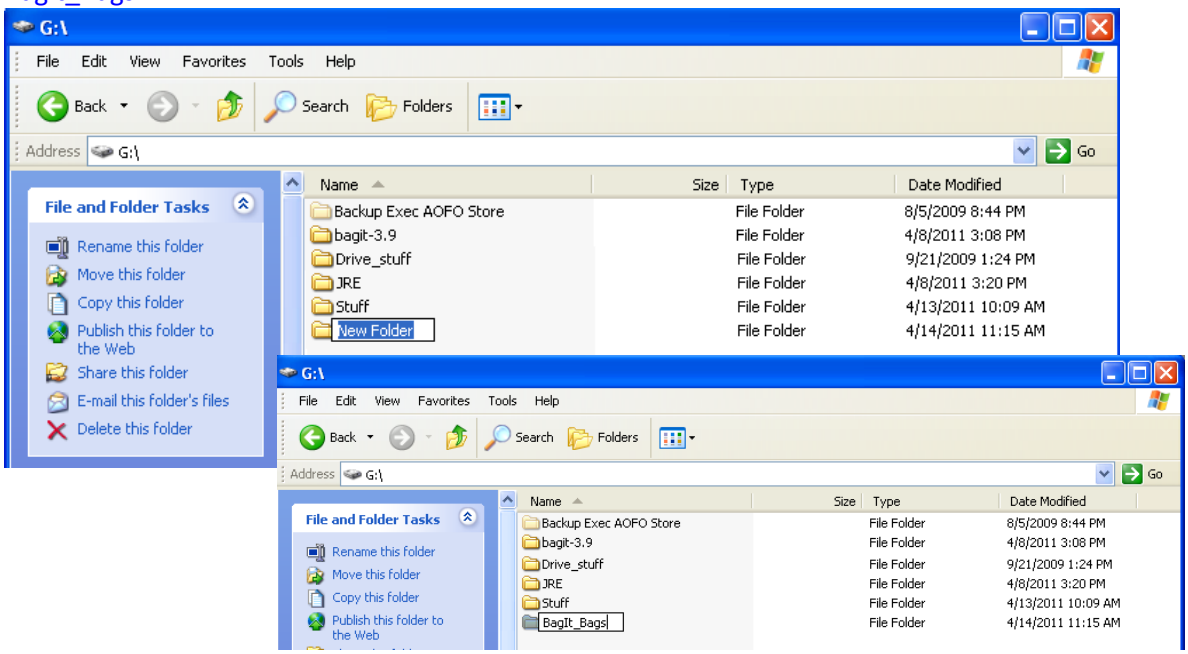


Note in this case the BagIt program and the Java Runtime Environment (JRE) program are installed on the portable disk device. In this case, you would not need to install BagIt and the JRE on your local computer. Your JRE **JAVA_HOME** environmental variable will need to point to the JRE directory on the **G:** drive
And when you run the BagIt bag command, you would run it from the **G:** drive.

1.4 Create a new directory under your **G:** directory by pointing into the folder window (the blank white space), press your ***right mouse button***, and select: **New -> Folder**

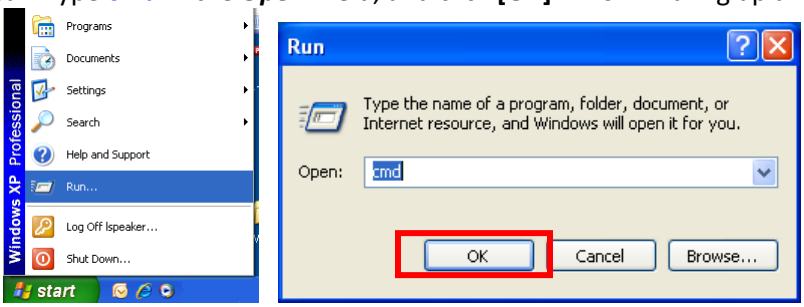


1.5 A **New Folder** icon will appear in your Windows Explorer View - and you can type in the folder name: BagIt_Bags

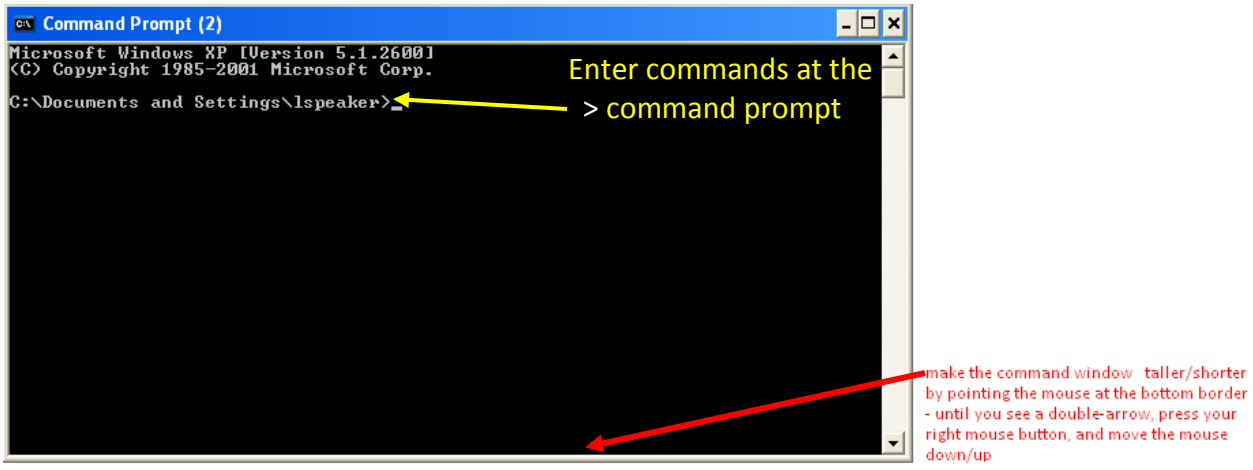


2. Create a bag on the **G:** drive in your BagIt_Bags folder
called my_Easley_Exec_Orders_**bag** that contains all of the folders and files under the directory H:\MyProjects\Gov_Easley_Executive_Orders

2.1 Open a DOS command window to run the bag command.
Click the **[Start]** button in the lower left corner of your display, and select **Run...** from the menu. The **Run window** will appear. Type **cmd** in the ***Open:*** field, and click **[OK].** This will bring up a DOS command window.

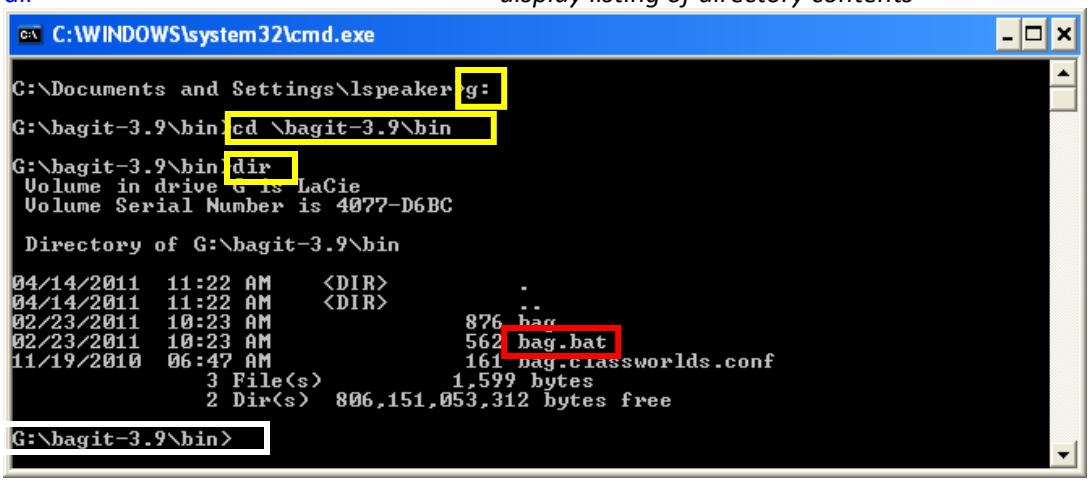


This will open a DOS command window. You will enter your commands at the > prompt



2.2 In the DOS window, change directory (cd command) to where you installed your BagIt program, and list the directory contents (dir command).

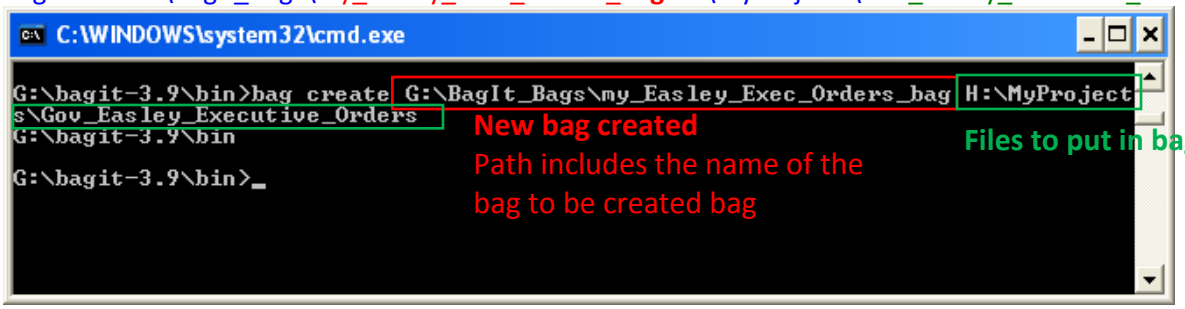
```
G:                          changes command 'focus' to the G: drive
cd  \bagit-3.9\bin          change directory
dir                         display listing of directory contents
```



The **prompt** should change to reflect your current directory location.
You should see the bag.bat file in the directory listing.

2.3. Issue the bag command to create a bag called my_Easley_Exec_Orders_**bag** that will contain all of the files under the Gov_Easley_Executive_Orders folder on your **H:** drive:
(refer to the diagram on page 3)

bag create G:\BagIt_Bags\my_Easley_Exec_Orders_**bag** H:\MyProjects\Gov_Easley_Executive_Orders



Note: you will need to provide the **full path** for both the bag and the location of the folder of files to bag
Note: Unfortunately the **create** option for BagIt version 3.9 does not report any message to the command window. You know the command has completed when you see the next command prompt.

File naming and bag naming recommendations:

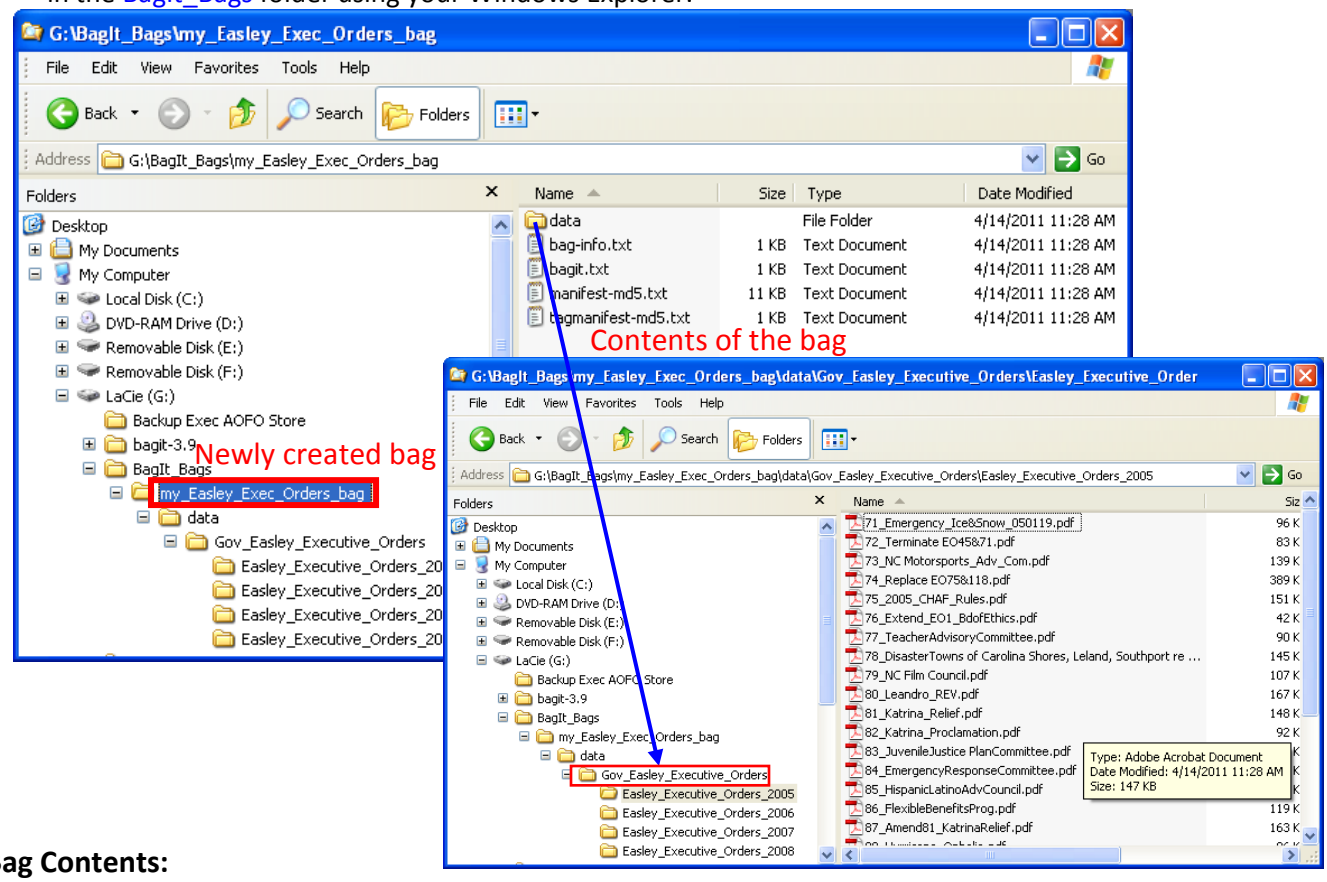
Some commands are sensitive to alpha case (uppercase, lowercase), spaces, and "special" characters such as spaces, asterisks (*), apostrophes ('), and quotes ("). Therefore, it is recommended that you create filenames that include only letters, numbers and underscore(_) or hyphen (-) as a separator, rather than a blank space.

e.g. Easley_Exec_Orders is preferred rather than Easley Exec Orders

Note: Since a BagIt "bag" looks essentially like a regular folder, and can appear anywhere in your directory hierarchy, we recommend that you append _Bag to the end of the bag name to further indicate that this folder is a bag.

Note: the length of time to create the bag depends on the number and sizes of the files you are including in the bag. For example, it took approximately 20 minutes to create a bag containing 3,100 files (3 GB) in a fairly complex folder structure.

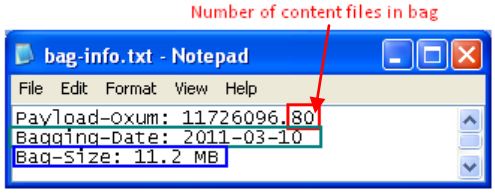
3. View the created bag on the G: drive,
   in the BagIt_Bags folder using your Windows Explorer.



Bag Contents:

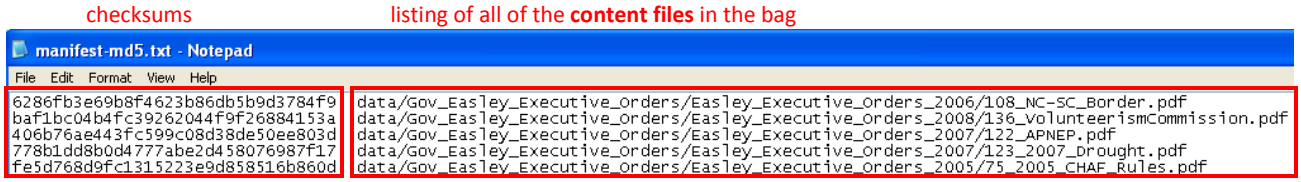
a. **data** folder - includes all of the directories and files that have been placed in the bag.

b. **bag-info.txt** - includes cursory metadata about the bag including bagging data and bag size.

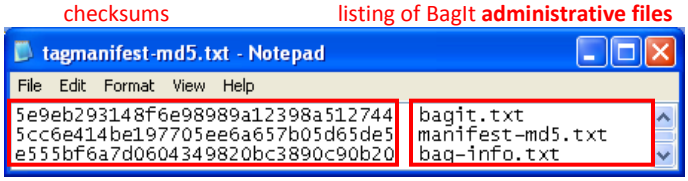


c. **bagit.txt** - a text file containing a declaration that this is a bag. (see page 5 for an example of this file)

d. **manifest-md5.txt** - a manifest listing the checksum and relative path of each file in the data folder.

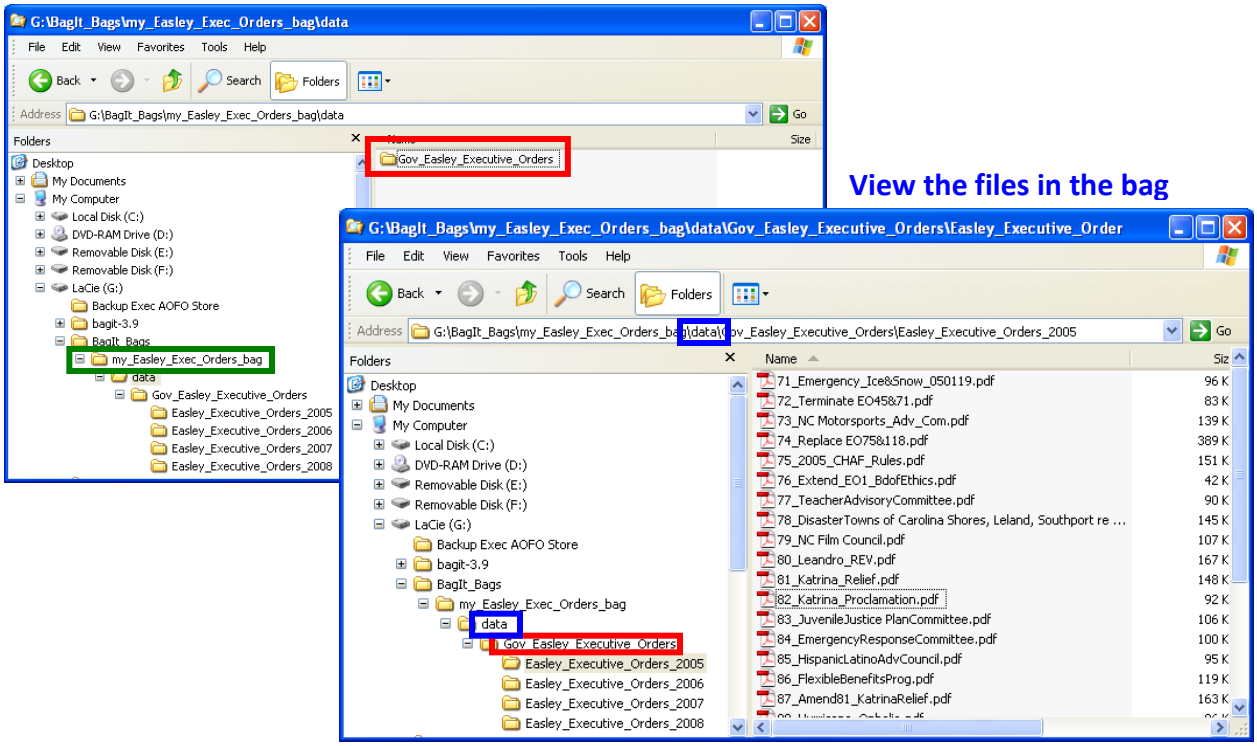


e. **tagmanifest-md5.txt** - a manifest listing the checksum and relative path of each BagIt tag file (the bag's descriptive text files).



Note: The *create* option also calculates checksums for the bag's tag files (the bag's descriptive text files displayed at the top of the bag's folder structure), so these files, likewise, CANNOT be altered after they have been created or the BagIt-recorded checksums will be invalidated.

As you navigate into the data folder you will see the file(s) and folder(s) you put into the bag. BagIt uses a logical packaging mechanism rather than a physical packaging mechanism, and all of the files retain their individuality, unlike packaging tools such as tar or zip that put all of the files into a package **file** (e.g. filecollection.zip or filecollection.tar).



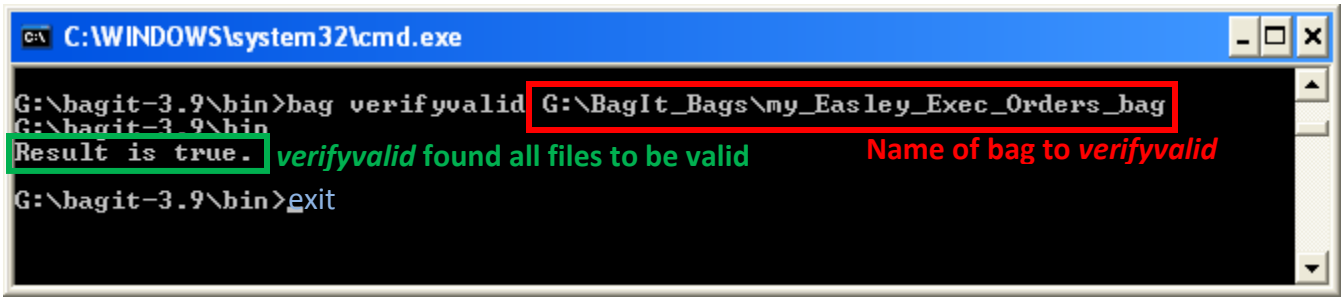
4. Bag Creator validates the bag was properly created.

The general command structure to validate a bag:

bag[space]verifyvalid[space]< *name of bag to verify* - including the full path >

Example:

bag verifyvalid G:\BagIt_Bags\my_Easley_Exec_Orders_bag



The bag is valid, and the output is "**Result is true**". If you do not receive a message that says, "Result is true", retry your verification. If you continue to get an erroneous result, something must have occurred in the course of creating the bag package, or the bag has been somehow modified. In this case, you should try to recreate the bag, and validate the new bag.

5. When finished with your BagIt options, type **exit** at the command prompt or close the command window.

6. Safely disconnect your USB-connected portable disk drive

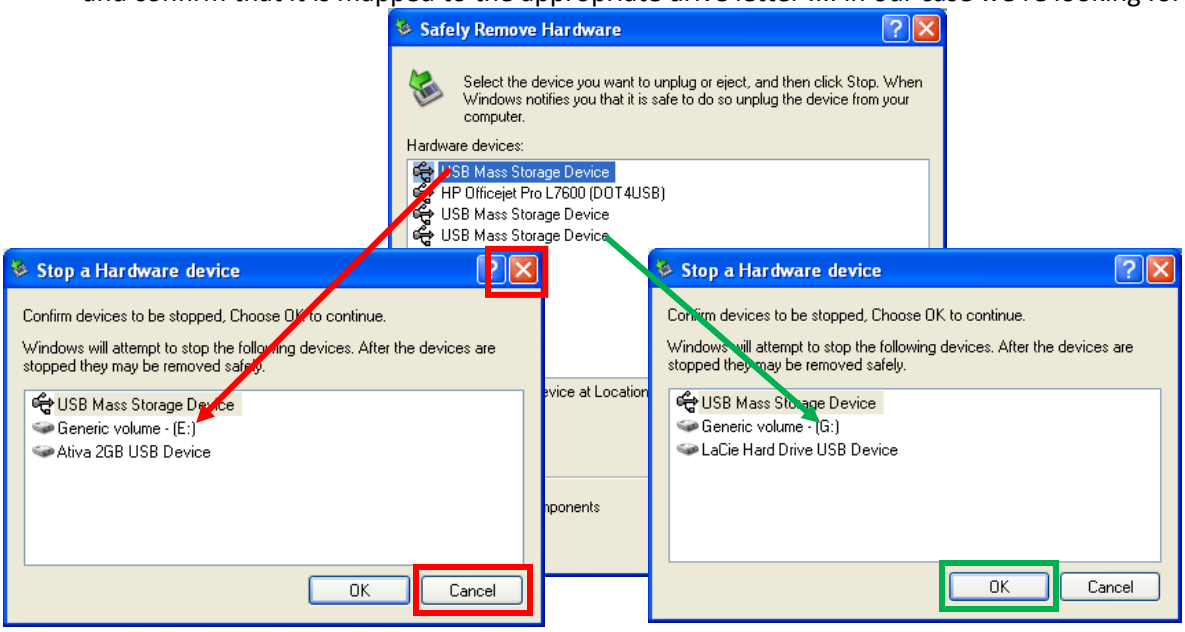
= = = = = = = = = = = = **!!! NOTE !!!** = = = = = = = = = = = =

Prior to removing the USB-attached disk drive from its port in your computer, you should first disconnect the operating system's connection to the drive.

In the **lower right corner** of your computer screen, you should see the "**Safely Remove Hardware**" icon:

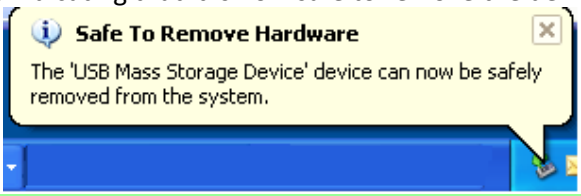
Point your mouse at the image, and press your *right-mouse-button*, and select the option (with your left mouse button): **"Safely Remove Hardware"**

The **Safely Remove Hardware** window should open listing your USB-attached devices. If you see more than one **USB Mass Storage Device**, double-click on USB Mass Storage Device to see device information, and confirm that it is mapped to the appropriate drive letter .... in our case we're looking for the **G:** drive.



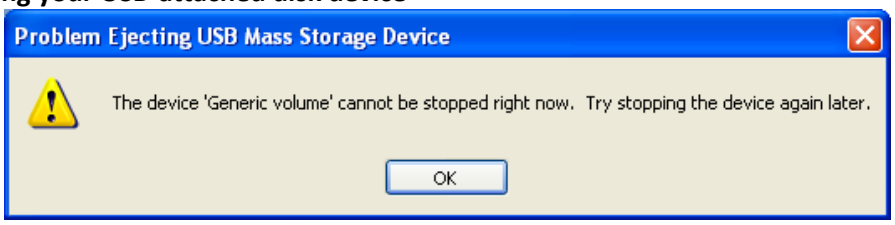
Select the **[OK]** button in the **Stop a Hardware device** window to disconnect the drive.

You should see a message indicating that it is now safe to remove the device:



Indicating it is now safe to physically remove the USB-attached drive from your computer.

Alternatively, you may get a message that **the device cannot be stopped** through the **Safely Remove Hardware** utility. In this case you will need to **shutdown** and **power off** your computer **before disconnecting your USB-attached disk device**



Disk Utilization Note:
If you use the **create** option, you are essentially making a copy of your data files and putting that copy (in the form of a bag) in the destination location. As such, if your destination location is also on your computer's local disk, you may need to make sure that you have enough storage space on your computer to have two copies of your data files. An alternative to the **create** option is the **baginplace** option. The **baginplace** option bags your data files in the same location as the source of the data files. To use the "**baginplace**" option, simply replace the **create** option with the **baginplace** option in the DOS command, and exclude the destination folder parameter. For more information on the "baginplace" option, at your DOS command prompt type:
bag[space]baginplace[space]--help.

3.7 To Transfer a bag:

If the sender created the bag on a shared network drive, no additional transfer action is necessary. The receiver need only be able to connect to that network shared drive to access the bag.

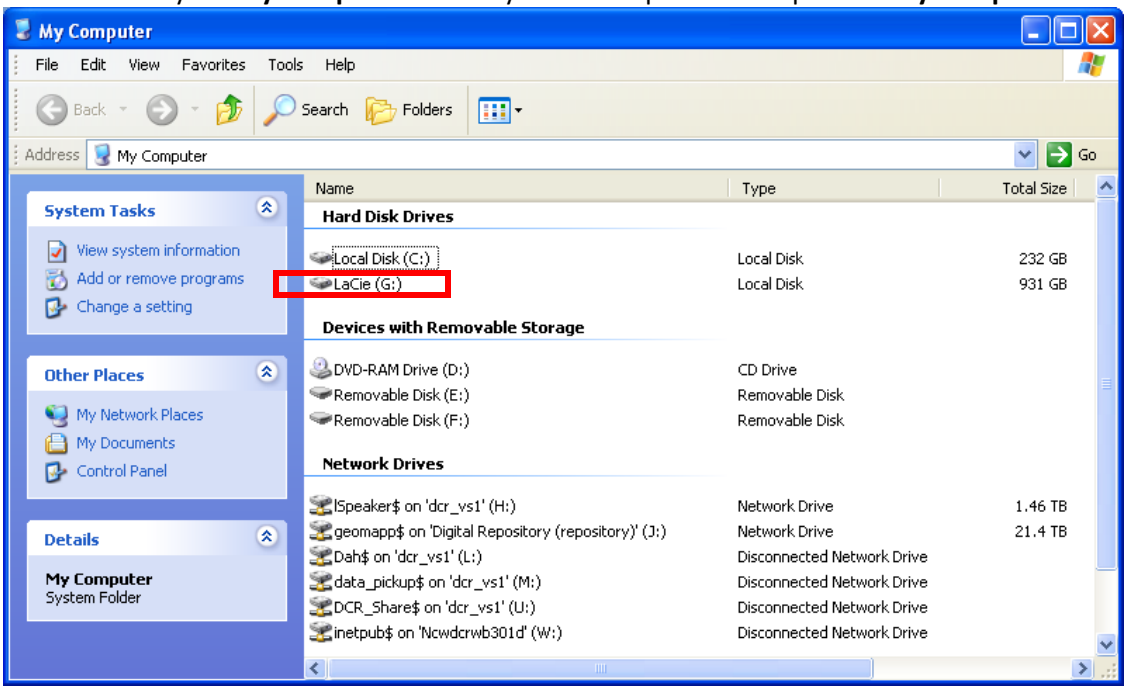
If the sender created the bag on a portable disk device (e.g. a USB-attachable disk or flash drive), the portable drive needs to be delivered to the receiver, who will then attach the portable drive to her computer via the USB attachment, and then she will be able to access the bag.

4. Receiver receives, verifies, and unpacks a bag:

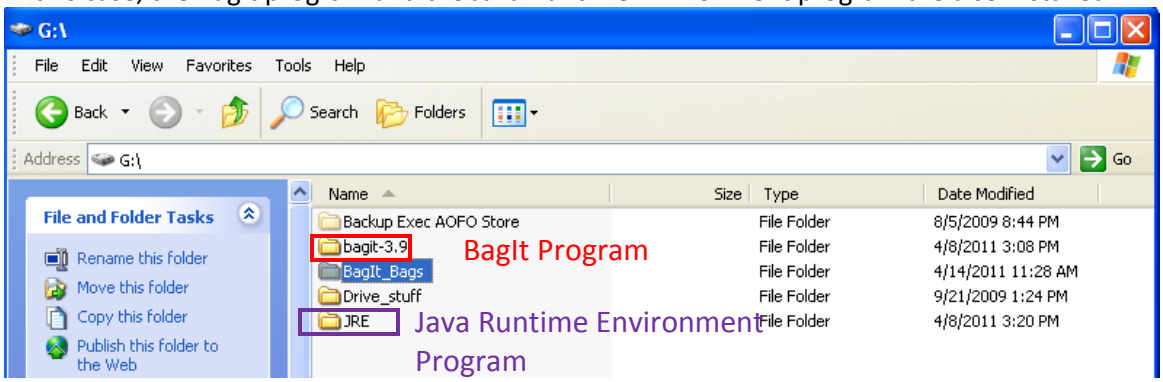
The receiver will either access the bag through a common shared drive, or by connecting a removable portable disk, such as a USB-attachable flash/thumb drive.

1. Receiver connects the USB-attachable portable disk or flash drive to her computer.
   In the following examples, assume the computer connects the USB-attachable flash/thumb drive to E: drive, or that the network share drive is connected to the E: drive.

2. Double-click on your **My Computer** icon on your desktop. This will open the **My Computer** window.

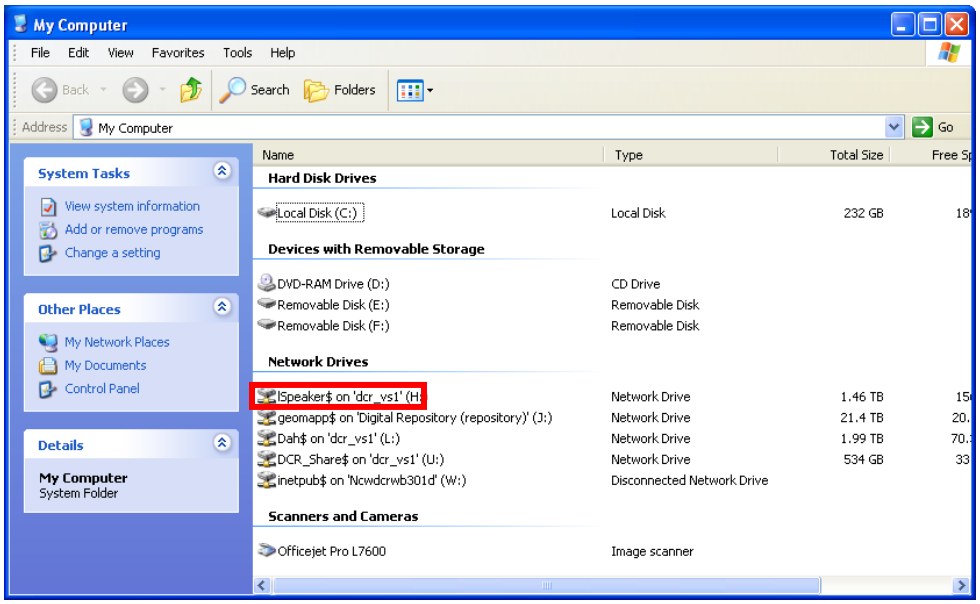


3. Double-click on the **Hard Disk Drives (G:)** icon. This will open a view of your **G:** drive
   Note: your portable disk drive may attach to another available Removable Storage drive letter other than **G:**
   You should see the **BagIt_Bags** folder, which holds the bag of files that is being transferred.
   In this case, the BagIt program and the Java Runtime Environment program are also installed.

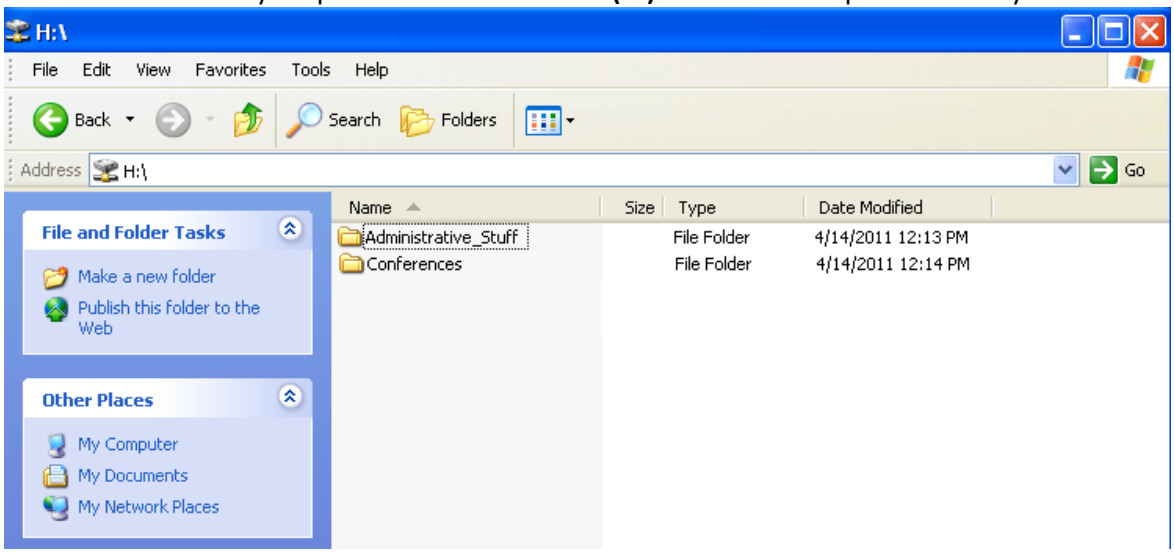


4.1 Copy the bag to a staging area on your personal share

4.1.1 Double-click on your **My Computer** icon on your desktop. This will open another **My Computer** window.

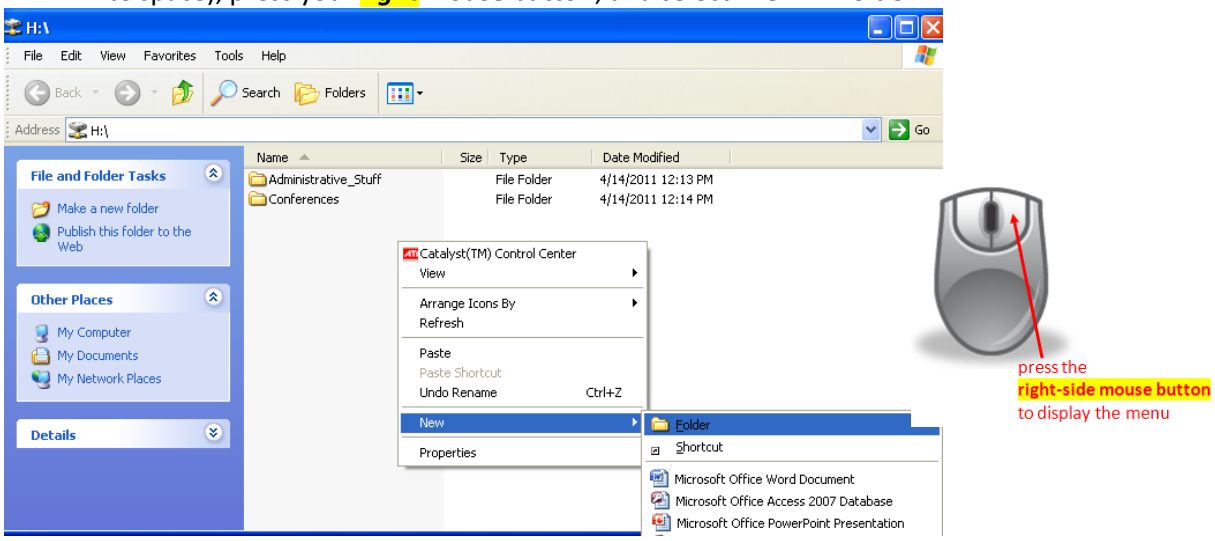


4.1.2. Double-click on your personal **Network Drive (H:)** icon. This will open a view of your **H:** drive

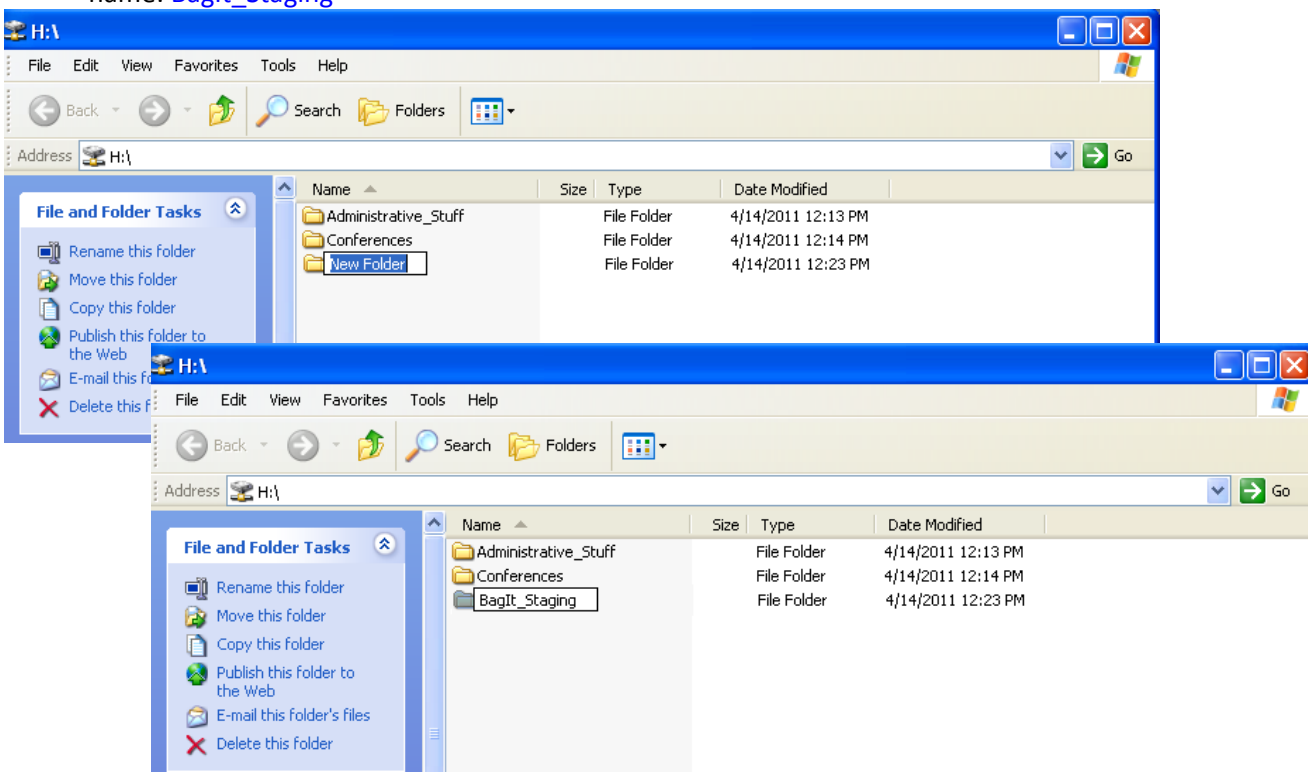


4.1.3 Create a staging folder on your **H:** drive to store a local copy of the bag

4.1.3.1 Create a new directory under your **H:** directory by pointing into the folder window (the blank white space), press your ***right mouse button***, and select: **New -> Folder**



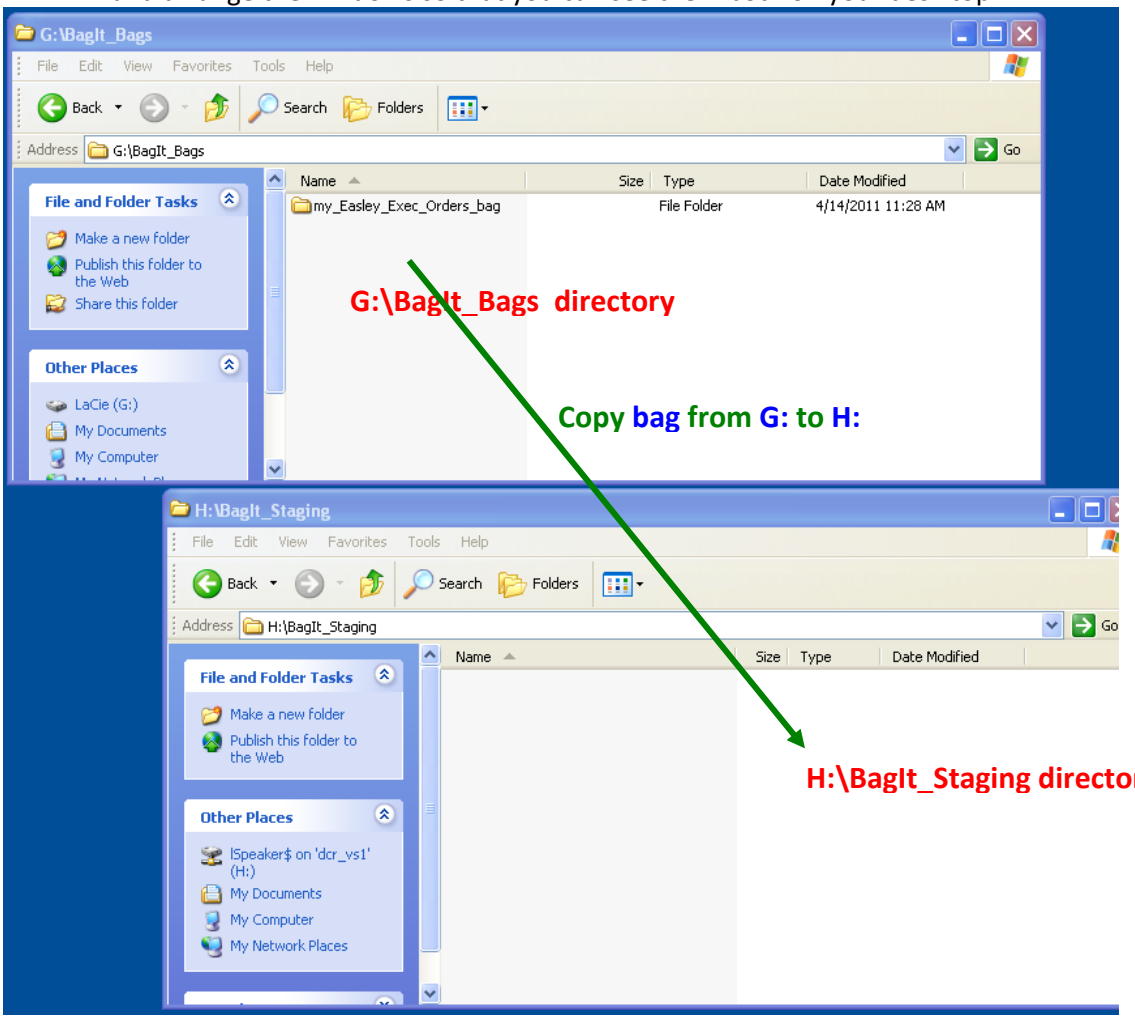
4.1.3.2 A New Folder icon will appear in your Windows Explorer View - and you can type in the folder name: BagIt_Staging



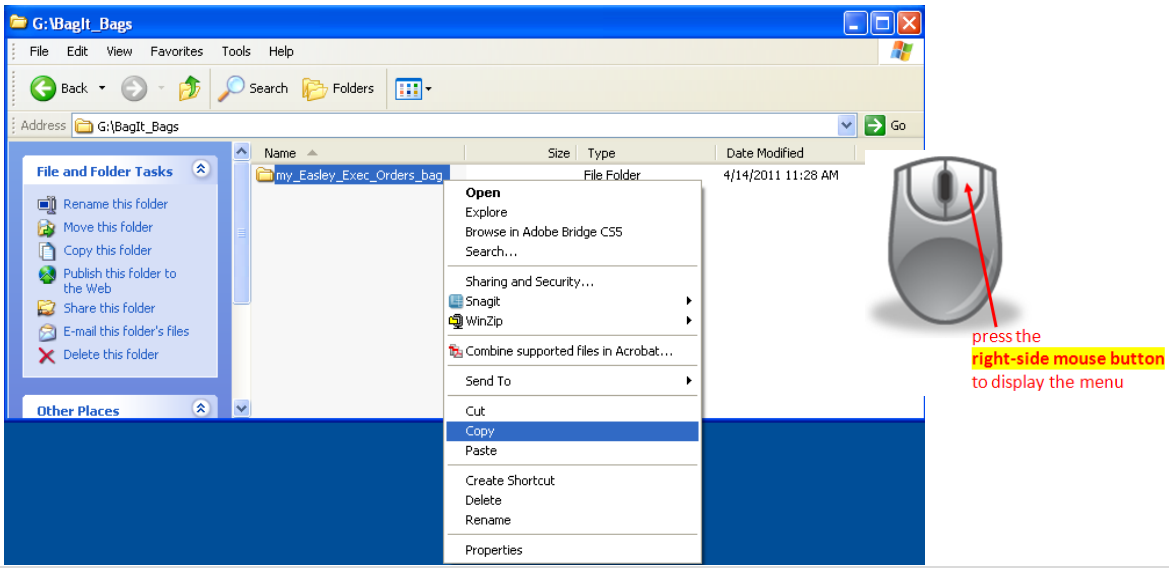
4.1.3.3 Double-click on BagIt_Staging folder to open it.

4.1.4 Copy the my_Easley_Exec_Orders_bag from your removable G: drive to your H:\BagIt_Staging folder

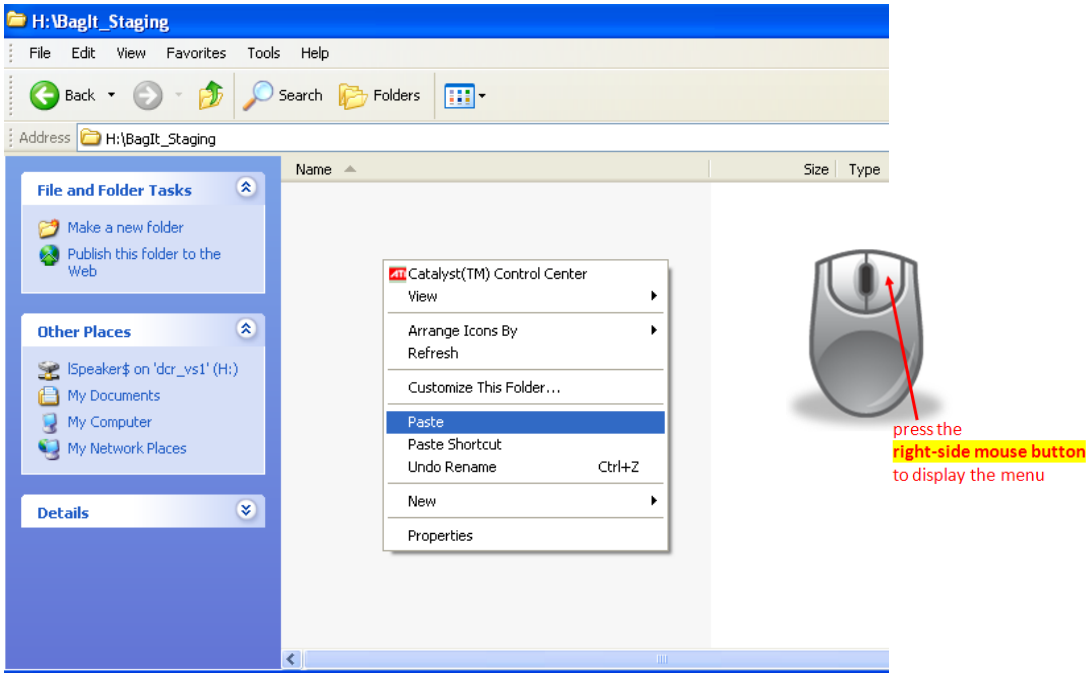
4.1.4. 1Find the Windows Explorer window that is displaying your G: drive,
Find the Windows Explorer window that is displaying your H: drive,
and arrange the windows so that you can see them both on your desk top



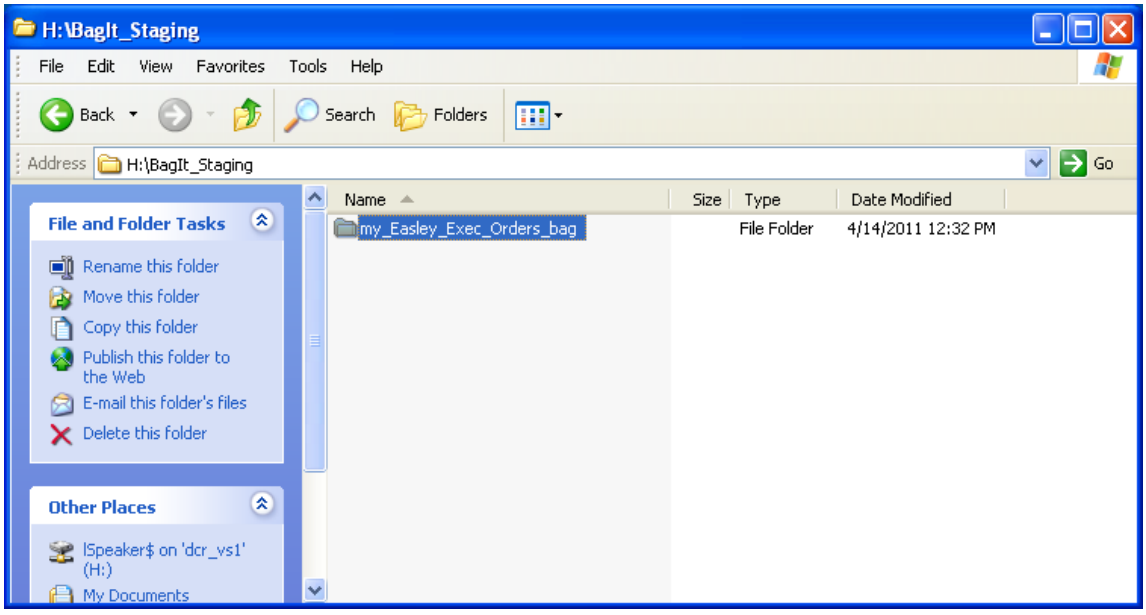
4.1.4.2 Click on my_Easley_Exec_Orders_bag to select, then press the *right-mouse-button* to display the menu, and select **Copy**



4.1.4.3 Move your mouse to the H:\BagIt_Staging window, and press the right-mouse-button to display the menu, and select **Paste**



4.1.4.4 You should see a copy status window briefly appear, and then the H:\BagIt_Staging window should display the my_Easley_Exec_Orders_bag



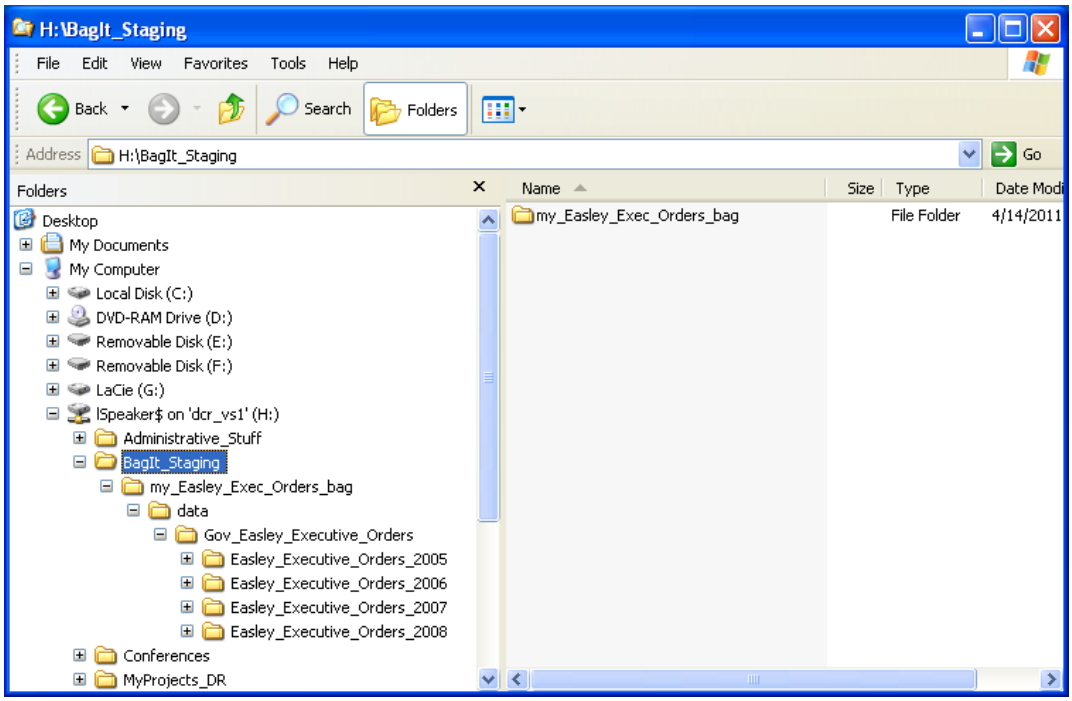
4.2. Receiver validates the H:\BagIt_Staging\my_Easley_Exec_Orders_bag received bag

The receiver needs to validate the bag to verify that the integrity of the files was maintained through the file transfer process.

The general command structure to validate a bag:

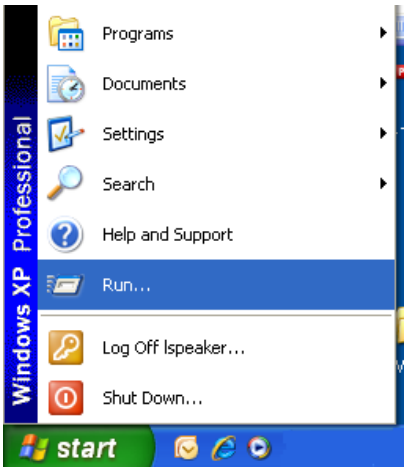
bag[space]verifyvalid[space]< *name of bag to verify* - including the full path >

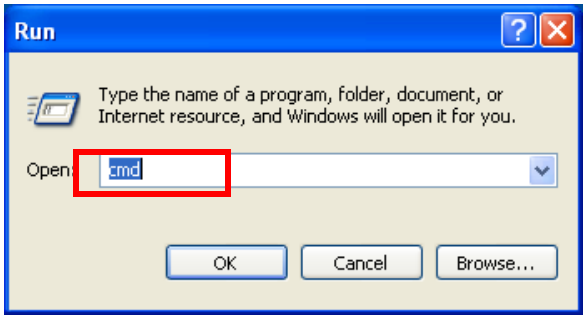
Example: The bag has been copied to a "staging" directory on my computer: **H:\BagIt_Staging** and needs to be validated prior to unpacking the bag



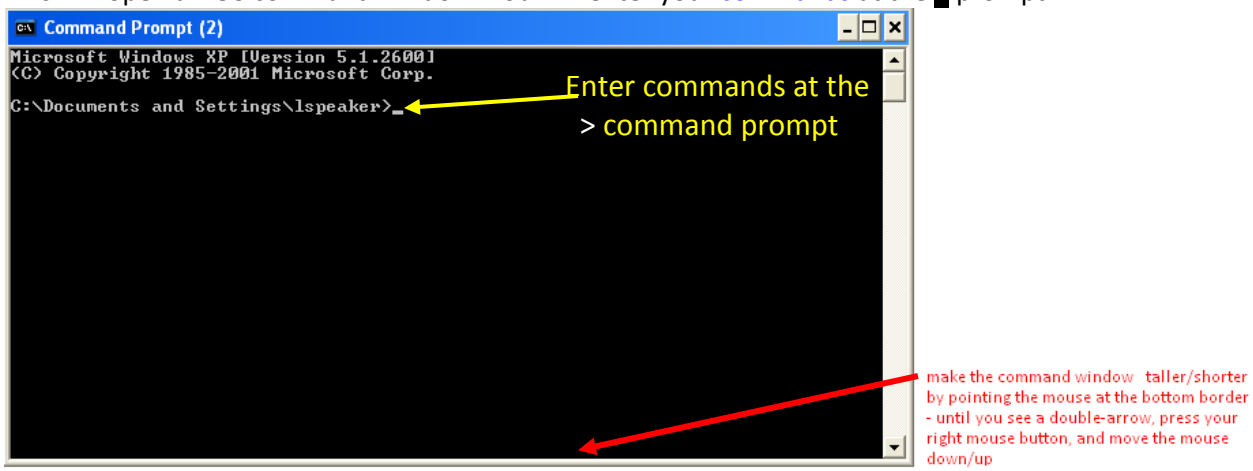
4.2.1 Open a **DOS command window** to run the bag command.

Click the **[Start]** button in the lower left corner of your display, and select **Run...** from the menu. The **Run window** will appear. Type **cmd** in the ***Open:*** field, and click **[OK].** This will bring up a DOS command window.

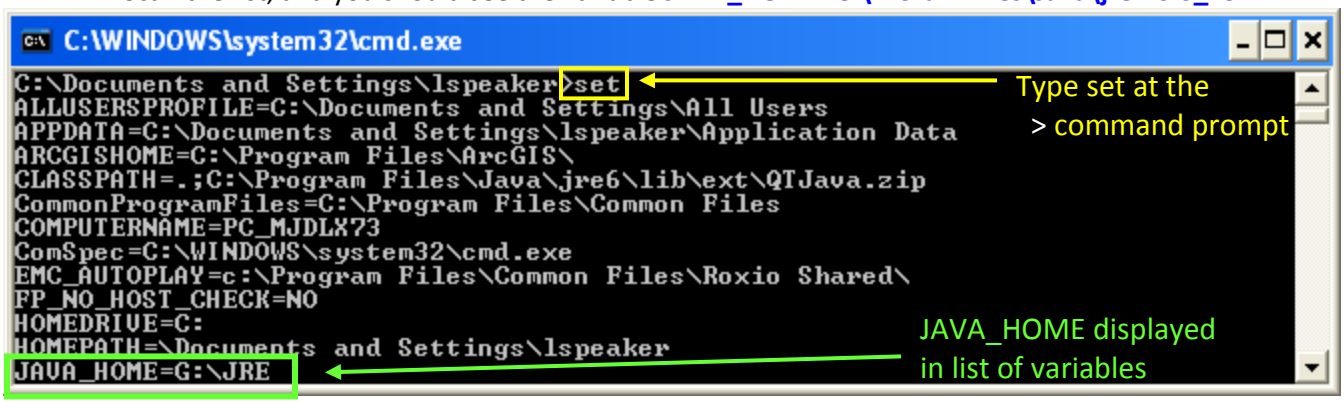




This will open a DOS command window. You will enter your commands at the > prompt.



4.2.2 Verify that your JAVA_HOME environment variable is set
by typing the command at the > command prompt: **set**
Scan the list, and you should see the variable **JAVA_HOME=C:\Proram Files\Java\jre1.6.0_23**

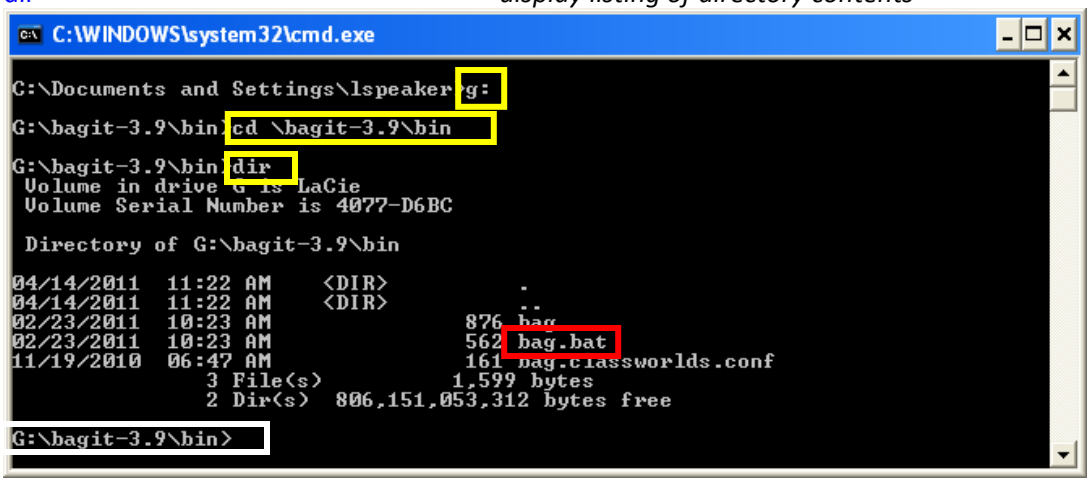


If you do not see the **JAVA_HOME** variable, return to step 1.2 in the installation instructions section to configure the environmental variable. You will need **Administrator access** to assign the **JAVA_HOME** variable.

Note: In the example above and below, the JRE program and the BagIt proram are installed on the portable disk device connected to the G: drive.

4.2.3 In the DOS window, change directory (cd command) to where you installed your BagIt program, and list the directory contents (dir command).

```
G:                          changes command 'focus' to the G: drive
cd  \bagit-3.9\bin          change directory
dir                         display listing of directory contents
```

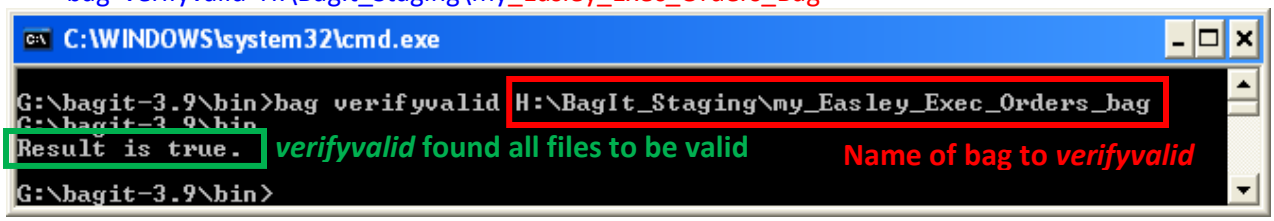


The **prompt** should change to reflect your current directory location.
You should see the bag.bat file in the directory listing.

4.2.4. Issue the bag command to **verify** the my_Easley_Exec_Orders_**bag** bag.

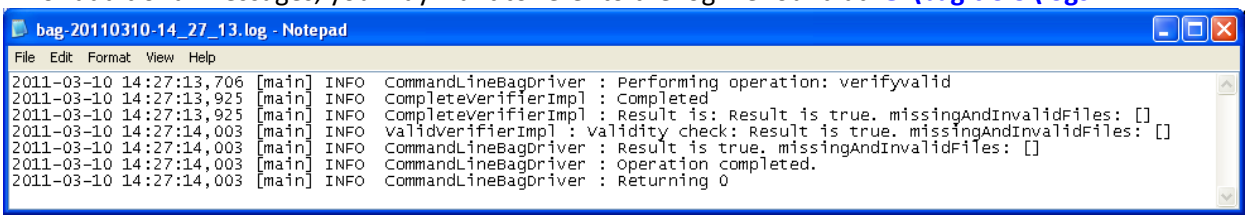
Example:

bag verifyvalid H:\BagIt_Staging\my_Easley_Exec_Orders_Bag



The bag is valid, and the output is "Result is true". If you do not receive a message that says, "Result is true", retry your verification. If you continue to get an erroneous result, something either occurred in the transfer or the bag was not "packed" correctly. In this case, you need to contact the sender and ask him to repackage and send the bag.

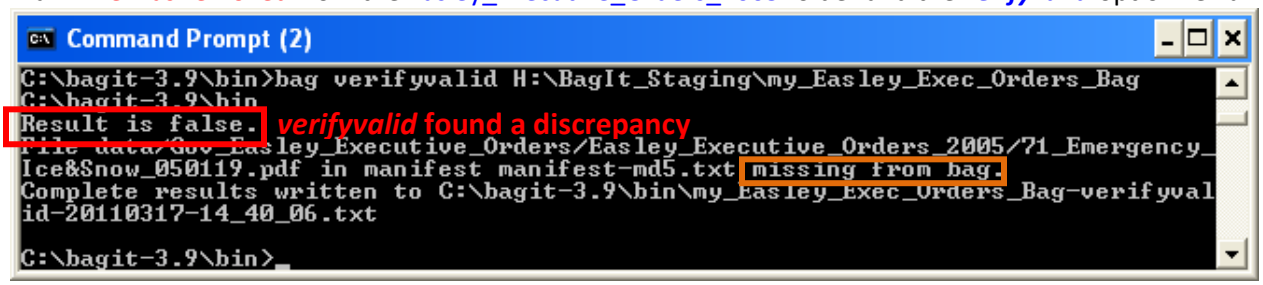
For additional messages, you may want to refer to the log file found at: **G:\bagit-3.9\logs**



Note: the length of time to verify the bag, likewise, depends on the number and sizes of the files you are including in the bag. For example, it took approximately 7 minutes to validate a bag containing 3,100 files (3 GB) in a fairly complex folder structure.

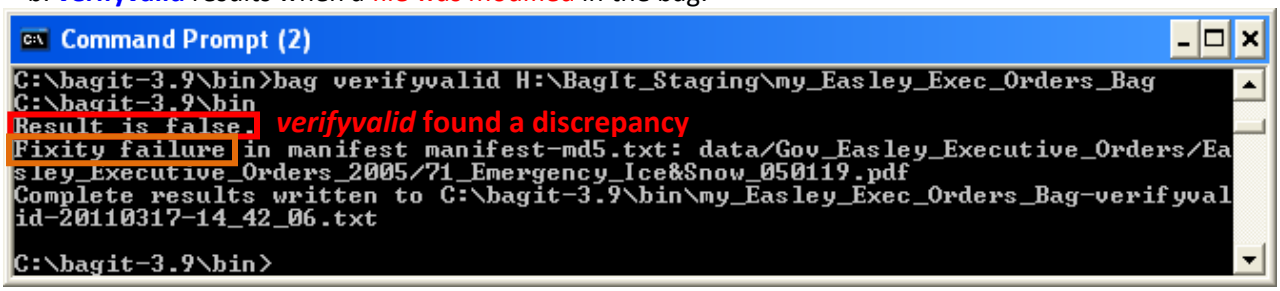
4.2.5 Results for a bag that is invalid

a. A file was removed from the Easley_Executive_Orders_2005 folder and the ***verifyvalid*** option re-run:



The bag is not valid, and the output is "Result is false", and BagIt reports the discrepancy it identified.

b. **verifyvalid** results when a file was modified in the bag:



The bag is not valid, and the output is "Result is false", and BagIt reports the discrepancy it identified.

4.2.6 When finished with your BagIt options, type **exit** at the command prompt or close the command window.

4.2.7 Safely disconnect your USB-connected flash drive.

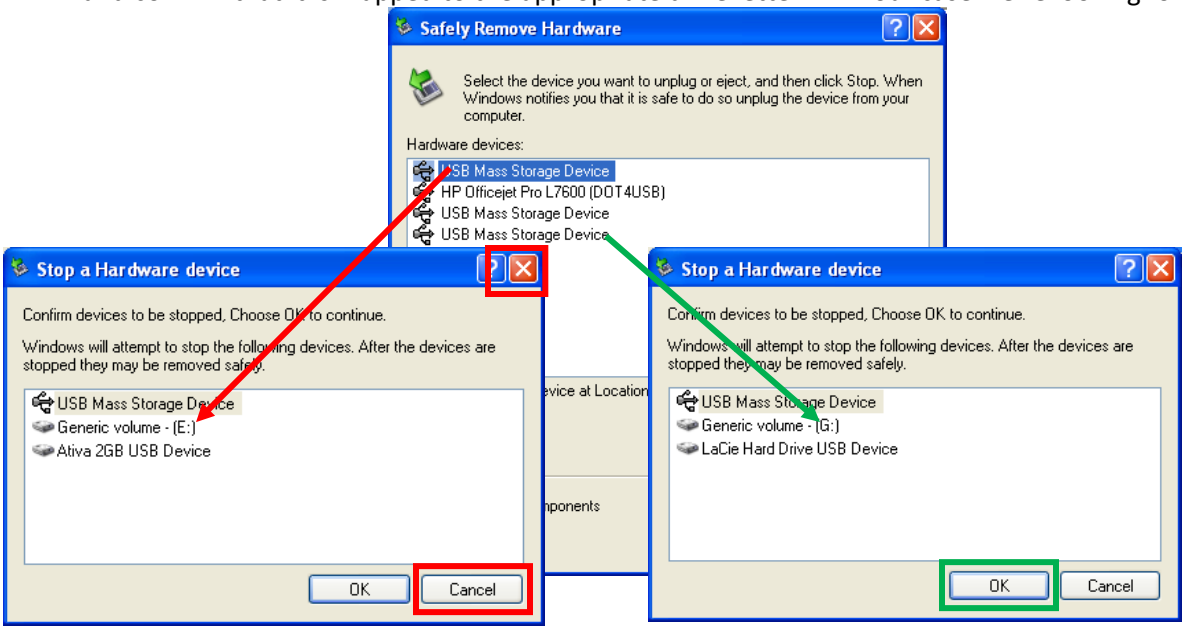
= = = = = = = = = = = **!!! NOTE !!!** = = = = = = = = = = =

Prior to removing the USB-attached disk drive from its port in your computer, you should first disconnect the operating system's connection to the drive.

= = = = = = = = = = = **!!! !!!!!!! !!!** = = = = = = = = = = =

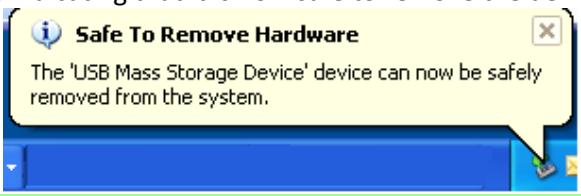
In the **lower right corner** of your computer screen, you should see the "Safely Remove Hardware" icon: 
Point your mouse at the image, and press your *right-mouse-button*, and select the option (with your left mouse button): **"Safely Remove Hardware"**

The **Safely Remove Hardware** window should open listing your USB-attached devices. If you see more than one **USB Mass Storage Device**, double-click on USB Mass Storage Device to see device information, and confirm that it is mapped to the appropriate drive letter .... in our case we're looking for the **G:** drive.



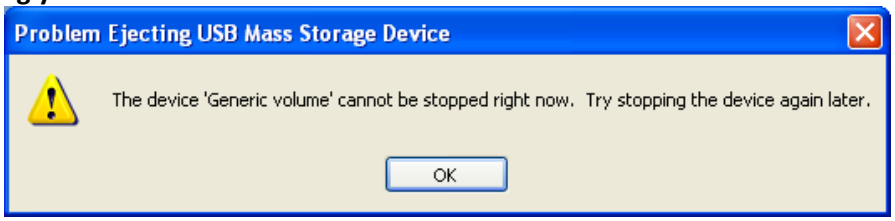
Select the **[OK]** button in the **Stop a Hardware device** window to disconnect the drive.

You should see a message indicating that it is now safe to remove the device:



Indicating it is now safe to physically remove the USB-attached drive from your computer.

Alternatively, you may get a message that **the device cannot be stopped** through the **Safely Remove Hardware** utility. In this case you will need to **shutdown** and **power off** your computer **before disconnecting your USB-attached disk device**



4.3. Receiver runs virus check software on the bag

Prior to unpacking the bag it is recommended that you run a virus checker program on the bag directory to ensure that the files have no viruses prior to copying them into your working area.
Run whatever software is recommended by your department.

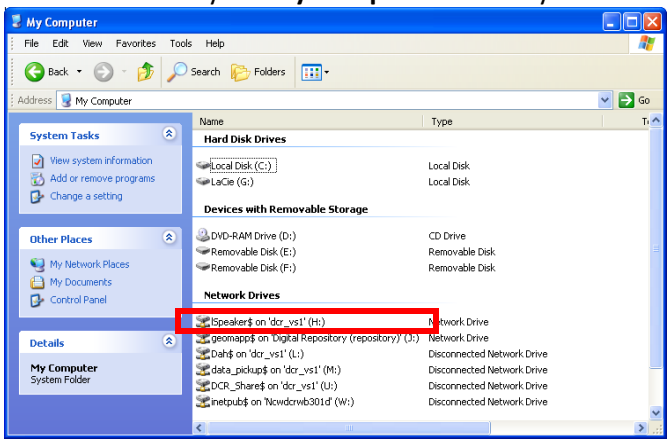
4.4. Receiver unpacks the bag

Now that you have validated that the files have successfully been transferred, and have not been modified or corrupted through the transfer process, you can unpack the bag.

"Unpacking" the bag is performed with a simple directory copy option through Windows Explorer.
We are going to copy the Gov_Easley_Executive_Orders folder from the BagIt_Staging area to our project folder.

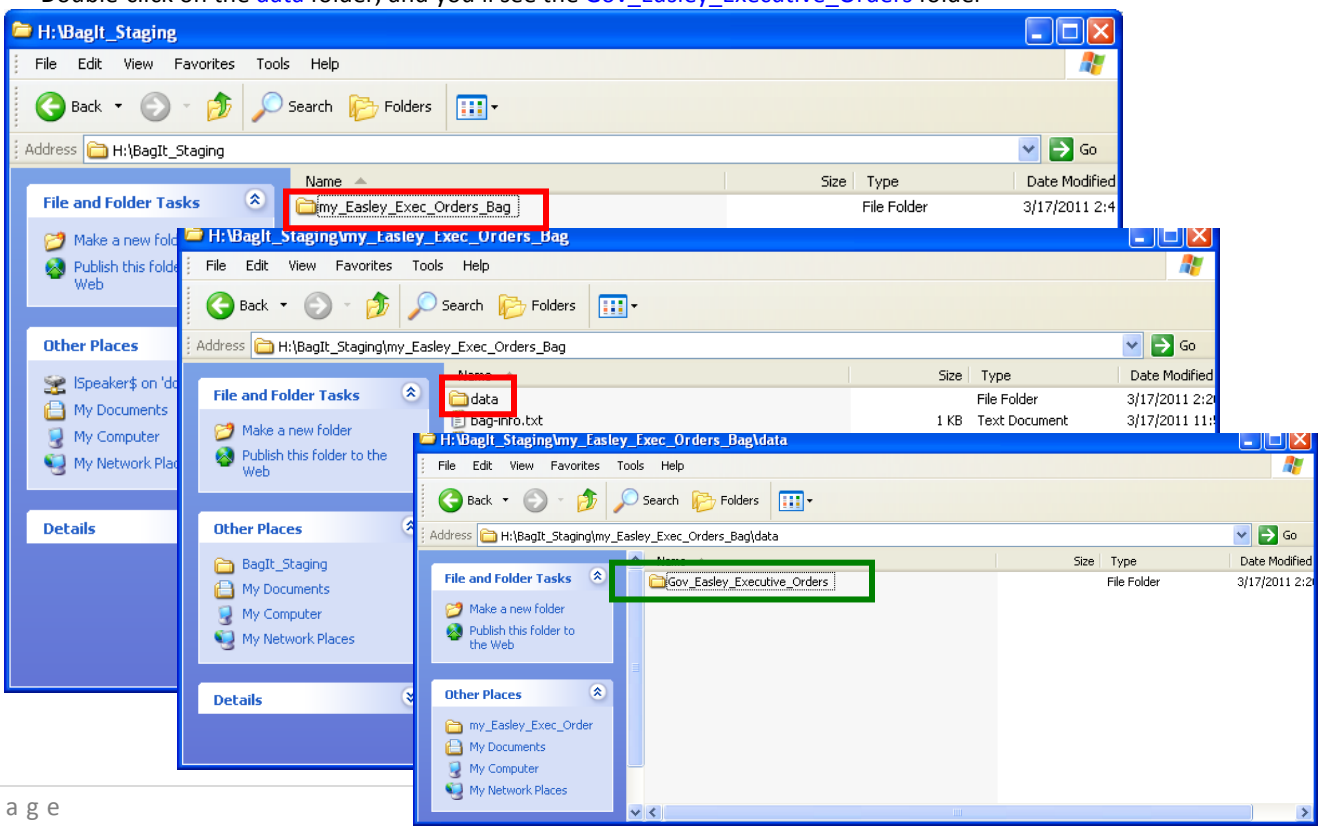
4.4.1 Open your H:\ drive

Double-click on your **My Computer** icon on your desktop. This will open another **My Computer** window.



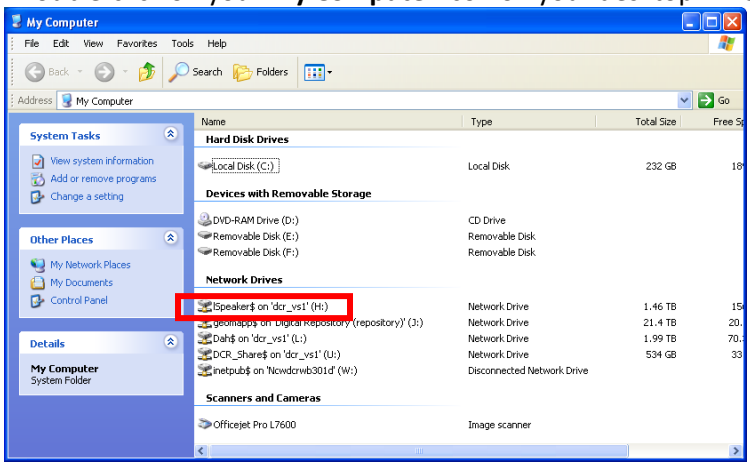
4.4.2. Double-click on your personal **Network Drive (H:)** icon. This will open a view of your H: drive

Double-click on BagIt_Staging folder
Double-click on the my_Easley_Exec_Orders_Bag folder
Double-click on the data folder, and you'll see the Gov_Easley_Executive_Orders folder



4.4.3 Open another window to access your H:\ drive

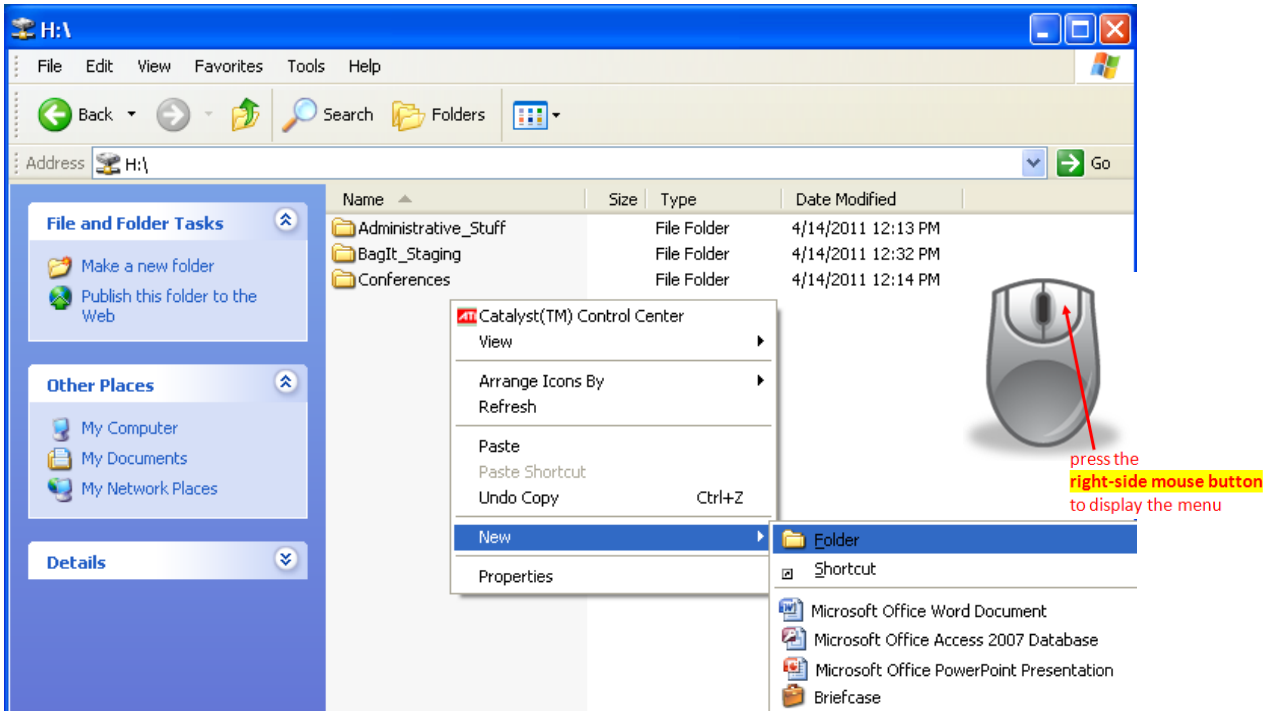
Double-click on your **My Computer** icon on your desktop. This will open another **My Computer** window.



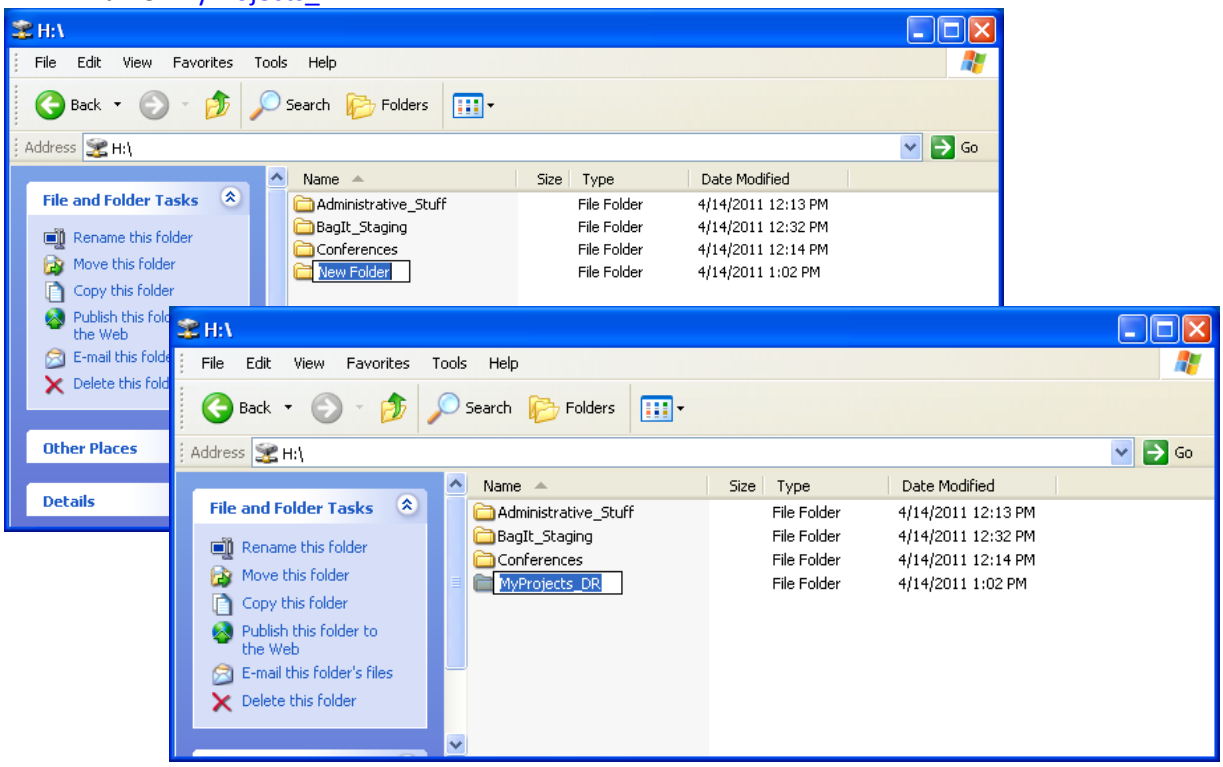
4.4.4. Double-click on your personal **Network Drive (H:)** icon. This will open a view of your H: drive

4.4.5 Create a new folder called MyProjects_DR (for **D**ata **R**eceiver) to store your unpacked files. Alternatively, open an existing folder where you want to store the unpacked files.

4.4.5.1 Create a new directory under your **H:** directory by pointing into the folder window (the blank white space), press your ***right mouse button***, and select: **New -> Folder**



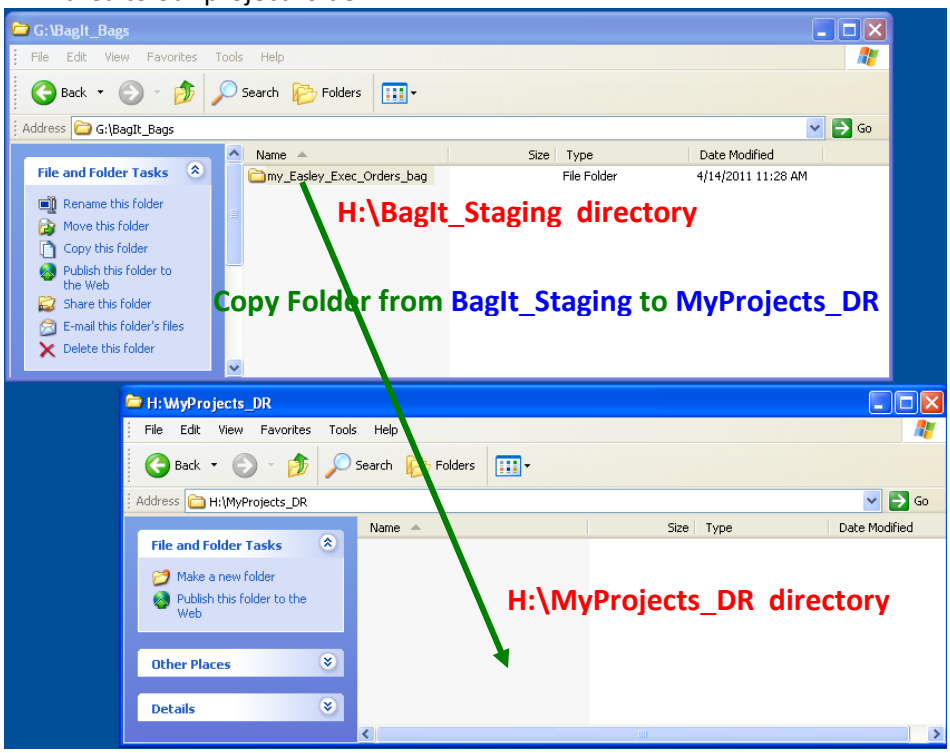
4.4.5.2 A New Folder icon will appear in your Windows Explorer View - and you can type in the folder name: MyProjects_DR



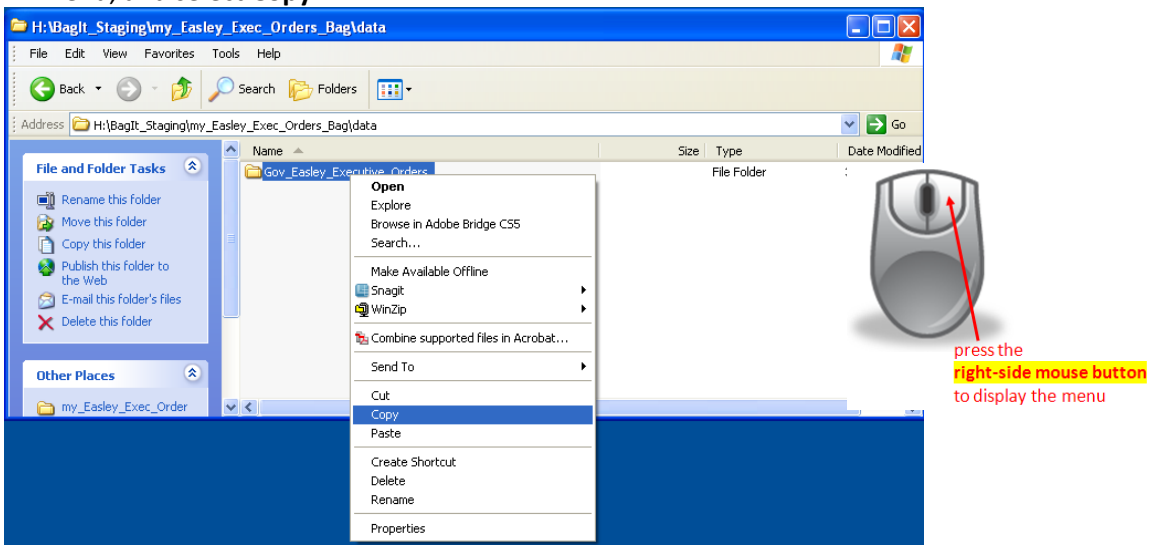
4.4.5.3 Double-click on MyProjects_DR folder to open it.

4.4.5.4 Arrange the two windows H:\BagIt_Staging\my_Easley_Exec_Orders_bag\data and H:\MyProjects_DR so that you can see them both on your desktop.

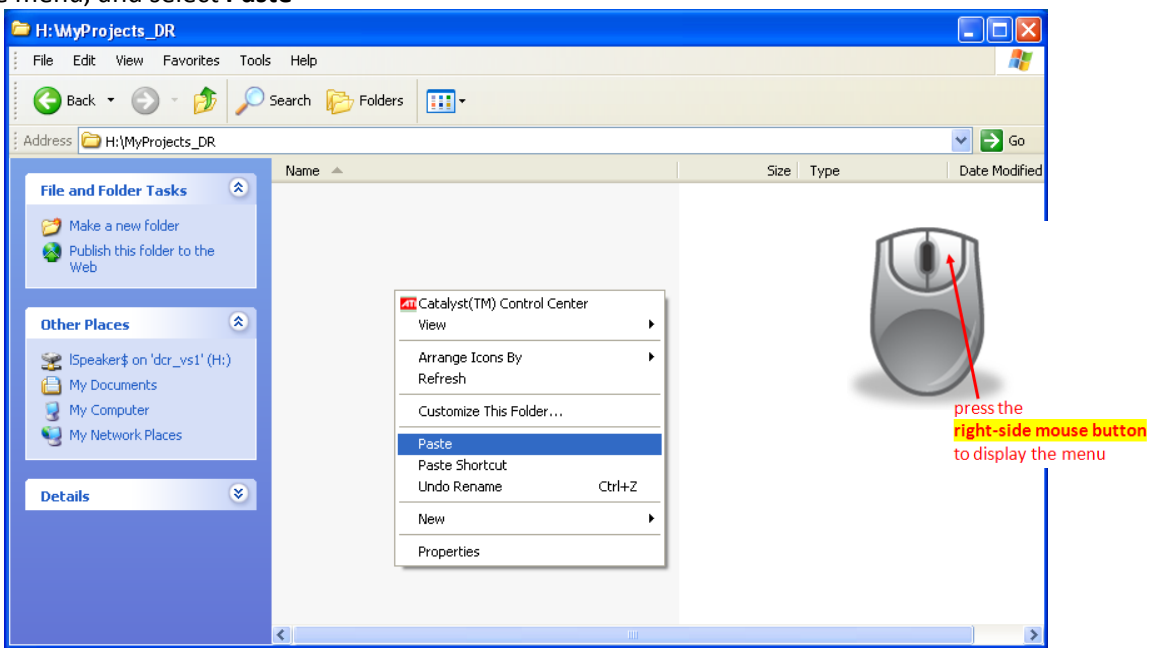
Here is where we are going to copy the Gov_Easley_Executive_Orders folder from the BagIt_Staging area to our project folder.



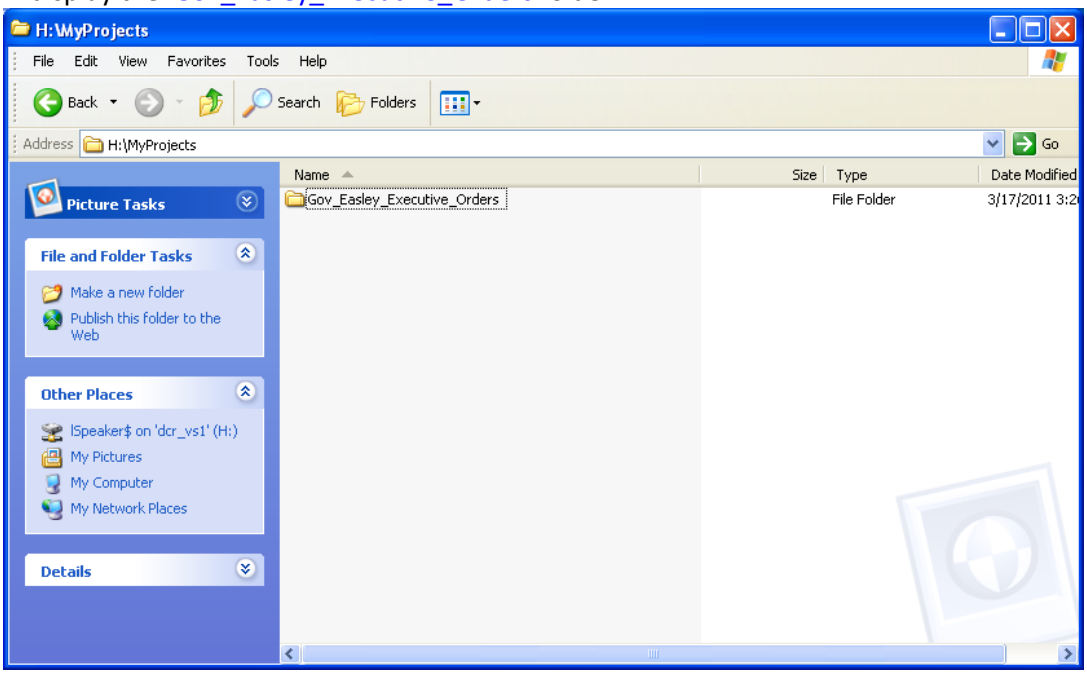
4.4.5.5 Click on Gov_Easley_Executive_Orders to select, then press the *right-mouse-button* to display the menu, and select **Copy**



4.4.5.6 Move your mouse to the H:\BagIt_Staging window, and press the *right-mouse-button* to display the menu, and select **Paste**



4.4.5.7 You may see a copy status window briefly appear, and then the H:\BagIt_Staging window should display the Gov_Easley_Executive_Orders folder

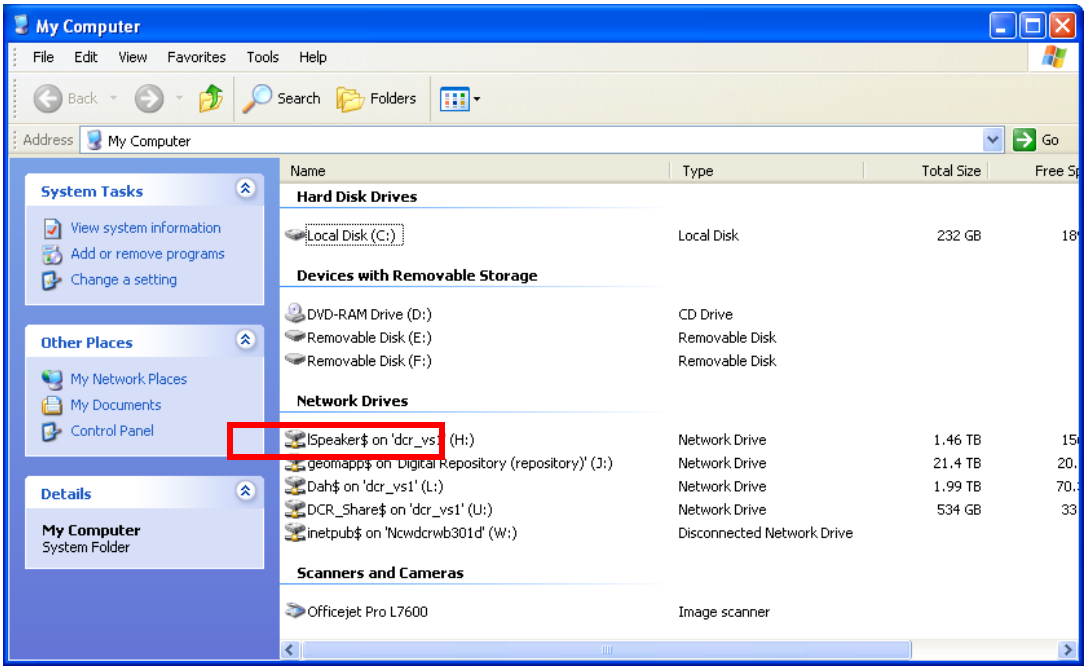


The bag is now "unpacked" and the files are ready for your use.

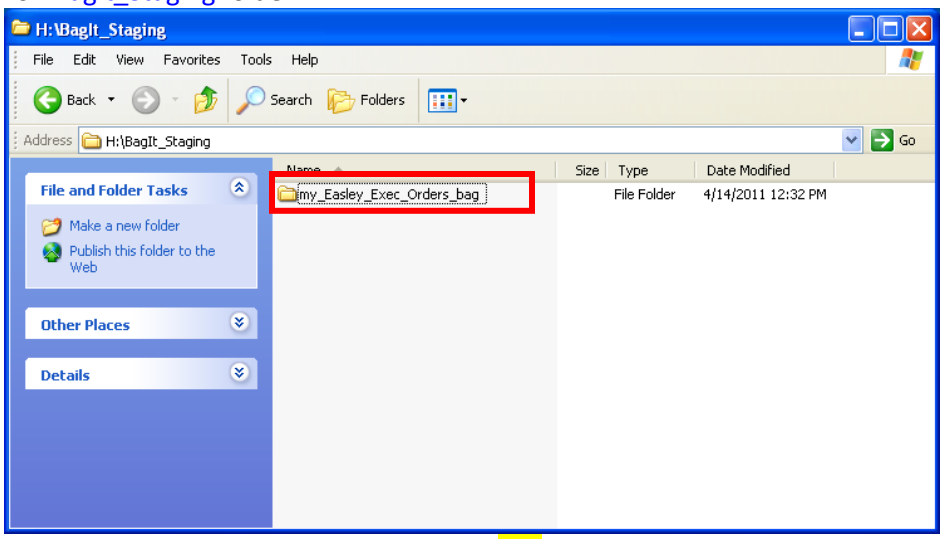
4.4.6 Final clean-up

You won't likely need the "bagged" version of these files in the future, so you can delete the bag: my_Easley_Exec_Orders_Bag.

4.4.6.1 Double-click on your **My Computer** icon on your desktop. This will open another **My Computer** window.

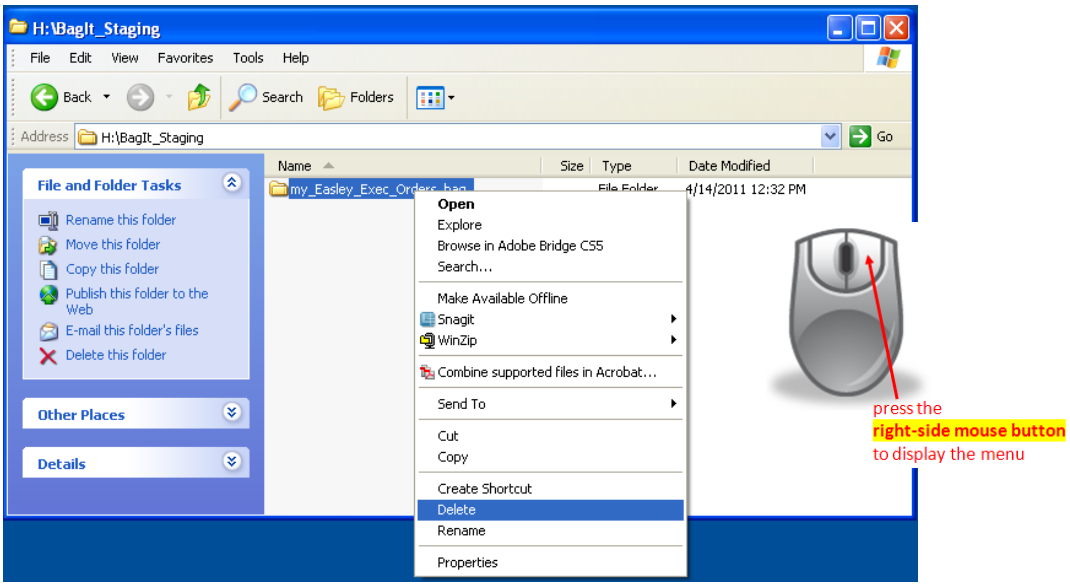


4.4.6.2. Double-click on your personal **Network Drive (H:)** icon. This will open a view of your H: drive
Double-click on BagIt_Staging folder



You are going to delete the my_Easley_Exec_Orders_**bag**

4.4.6.3 Single click on the folder name to select it, and then press the right-mouse-button, and select the option: **Delete**

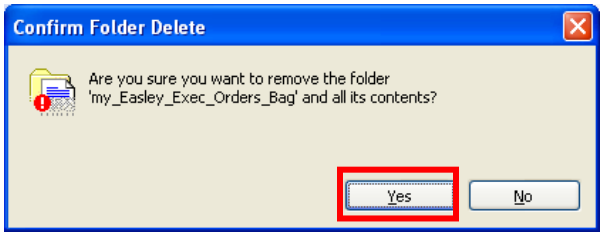


You will see a window asking you to confirm the delete process.

********** **!!!!!NOTE!!!!!** **********

DOUBLE CHECK THAT YOU ARE DELETING THE "_Bag" folder, and not the folder of files you just unpacked from the bag. This is where it's especially helpful if you tacked a "_Bag" on the end of your bag name.

********** **!!!!!!!!!!!!!!!!** **********



Select **[Yes]** to confirm the delete operation.

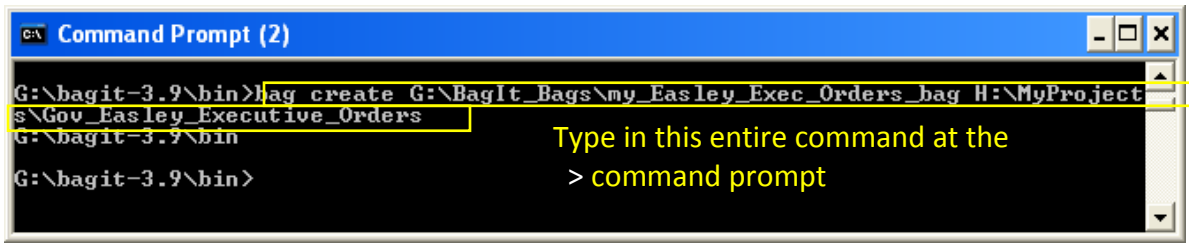
Appendix A: BagIt bag *create* and *verifyvalid* Command Summary:

BagIt Library (BIL) Version 3.7.1
Usage: bag <option> [option arguments] [--help]

a. To list all of the bag options:
bag

b. The general command to **create** a bag:
bag[space]create[space]<*name of bag to create* - including the full path>[space]<*files you want to bag* - including full path to the directory containing the source files you want to bag>

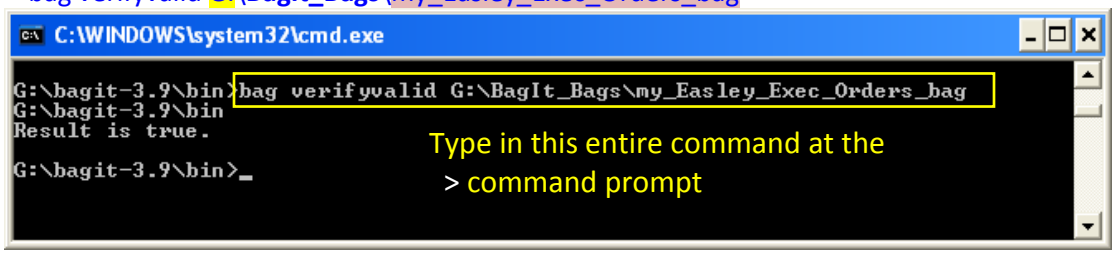
Example:
bag create G:\BagIt_Bags\my_Easley_Exec_Orders_bag H:\MyProjects\Gov_Easley_Executive_Orders



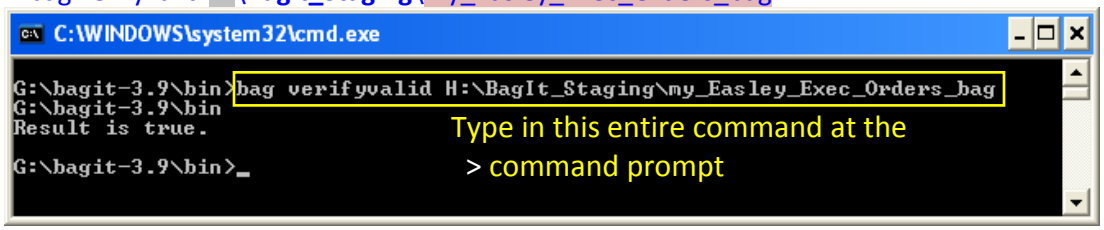
Note: You can include several directories in a single bag. Just provide the complete path to each directory separated by a space.
bag create G:\BagIt_Bags\my_NC_Govs_Exec_Orders_Bag H:\MyProjects_2009-now\Gov_Perdue_EOs H:\MyProjects_2001_09\Gov_Easley_EOs H:\MyProjects_1993_2001\Gov_Hunt_EOs H:\MyProjects_1985-1993\Gov_Martin_EOs

c. The general command to **verify** a bag:
bag[space]verify[space]<*name of bag to verify* - including the full path>

Example:
Sender verifies bag prior to sending:
bag verifyvalid G:**BagIt_Bags**\my_Easley_Exec_Orders_bag



Receiver verifies bag after copying to local staging area:
bag verifyvalid H:**BagIt_Staging**\my_Easley_Exec_Orders_bag



BagIt Log File: C:\bagit-3.9.\logs\bag-YYYYMMDD-##_##_##.log

Appendix B: BagIt bag create and bag retrieve Process Summary:

PREPARATION to run the BagIt *bag* command

view **JAVA_HOME** environmental variable setting (assumes JRE installed on **C:** drive)
(You can check the Java entry in the Control Panel to see where your JRE is installed)
> set
JAVA_HOME=C:\Program Files\Java\jre6

Assumes BagIt application is installed on Portable Drive connected at **E:**
> E:
> cd \bagit-3.9\bin
> dir
bag
bag.bat

CREATING A BAG

1a. create a Bag with one folder:
> bag create E:\BagIt_Bags\my_Easley_Exec_orders**_bag** H:\MyProjects\Gov_Easley_Executive_Orders
name of bag creating list of files to put in bag
** use **_bag** suffix to denote that this is a bag

1b. create a Bag with several folders
> bag create E:\BagIt_Bags\my_NC_Gov_Exec_orders**_bag** H:\MyProjects\Gov_Easley_Executive_Orders H:\MyProjects_Gov_Perdue_Executive_Orders H:\MyProjects\Gov_Hunt_Executive_Orders

2. To verify a Bag:
> bag verifyvalid E:\BagIt_Bags\my_Easley_Exec_orders**_bag**
name of bag to verify/validate
Result is True - means that the bag is valid
Result is False - means that something in the bag is altered. Read message for more information

RETRIEVING, VERIFYING, UNPACKING A BAG

1. Copy bag from the Portable Disk Device to a local "staging" folder (e.g. H:\BagIt_Staging)

2. Verify the bag has arrived intact and unaltered
> bag verifyvalid H:\BagIt_Staging\my_Easley_Exec_orders**_bag**
name of bag to verify/validate
Result is True - means that the bag is valid
Result is False - means that something in the bag is altered. Read message for more information

3. Navigate down into H:\BagIt_Staging\my_Easley_Exec_orders**_bag\data**

4. Use Windows Explorer to copy the files out of the bag into your local working space from the **data** folder

BagIt INFORMATION FILES

bag-info.txt - records # of files in the bag, the date the bag was created, the disk utilization size for the bag
manifest-md5.txt - records the list of all files put inti the bag and the checksum for each of the files (see data dir)
tagmanifest-md5.txt - records the list of all of the bag information files and the checksum for each info file